Nabertherm
MORE THAN HEAT 30-3000 °C

Operating Instructions

High-Temperature Furnace (Tabletop Model)

HTCT 01/14 - HTCT 01/16

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Original instructions

Made
in
Germany

www.nabertherm.com

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1 Introduction

Dear Customer,

Thank you for choosing a quality product from Nabertherm GmbH.

You can be proud that you have chosen an oven which has been especially tailored to suit your manufacturing and production conditions.

This product is characterized by

- professional workmanship
- high performance due to its high efficiency
- high-quality insulation
- low power consumption
- low noise level
- simple installation
- easy to maintain
- high availability of spare parts

Your Nabertherm Team

Note

These documents are intended only for buyers of our products and may not be copied or disclosed to third parties without our written consent.

(Law governing copyright and associated protective rights, German Copyright Law from Sept. 9, 1965)

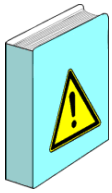
Protective Rights

Nabertherm GmbH owns all rights to drawings, other documents and authorizations, also in case of applications for protective rights.

Note

All the figures in the instructions have a descriptive character; in other words, they do not represent the exact details of the oven.

1.1 Product Description



This high-temperature laboratory furnace is a quality product which will give you many years of reliable service if it is properly cared for and maintained. One basic requirement is that the furnace is used for the purposes for which it was intended.

During development and production high priority was placed on safety, functionality and economy.

High-temperature furnaces in the HTCT range. Designed as **table-top models,** these compact high-temperature furnaces offer many benefits. These furnaces are all-rounders in research facilities and laboratories. They are made from expertly finished, high-quality materials and are easy to operate. The furnaces are also ideally suited for sintering technical ceramics, such as zirconium oxide dental bridges. The very best insulation materials permit energy-saving operation and fast heating times thanks to low heat storage and thermal conductivity. High-temperature furnaces in the HTCT range reach a chamber temperature of max. 1400°C (2552°F),1500°C (2732°F) or 1600°C (2912°F).

Other features of this product are:

- High-quality silicon carbide (SiC) heating elements
- Heating elements are easy to replace
- High-quality fiber material designed for the furnace temperatures
- Stainless steel structured housing
- Double-wall housing with additional fan cooling for low external temperatures
- Adjustable fresh air opening, exhaust air vent in the top
- Lift door, with the hot side facing away from the operator
- Type S thermocouples
- Switchgear with semi-conductor relays calibrated for the heating elements

Additional equipment

- Over-temperature limit controller with manual reset for thermal protection class 2 in accordance with EN 60519-2 as a temperature limiter to protect the furnace and the load
- Rectangular batch containers, can be stacked for charging in several levels
- Manual or automatic gas supply system
- RS 422 digital interface, can be used, for example, for process control and documentation via Controltherm MV software package

1.2 Overview of the Complete Oven

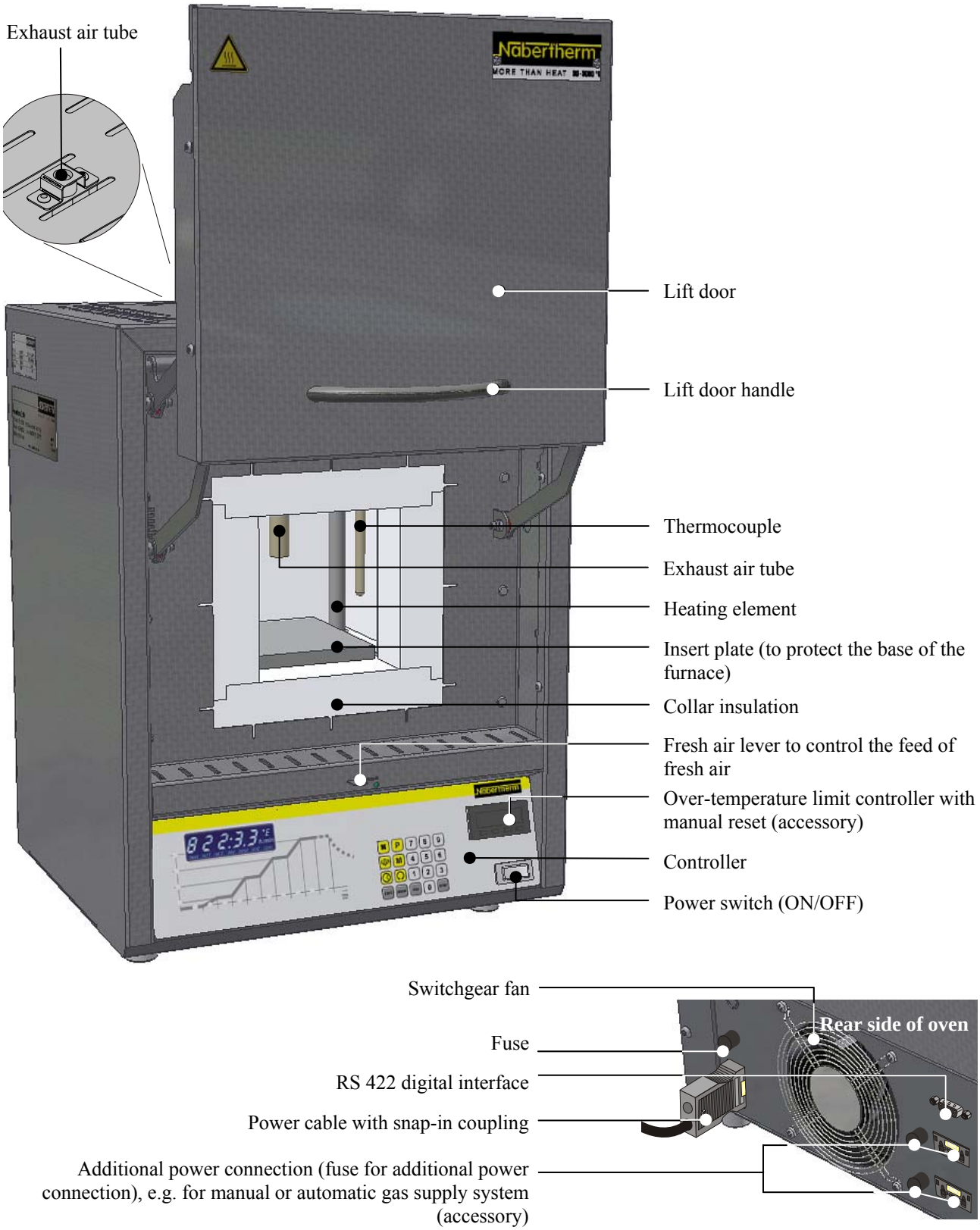

Exhaust air tube
Lift door
Lift door handle
Thermocouple
Exhaust air tube
Heating element
Insert plate (to protect the base of the furnace)
Collar insulation
Fresh air lever to control the feed of fresh air
Over-temperature limit controller with manual reset (accessory)
Controller
Power switch (ON/OFF)
Switchgear fan
Fuse
RS 422 digital interface
Power cable with snap-in coupling
Additional power connection (fuse for additional power connection), e.g. for manual or automatic gas supply system (accessory)
Rear side of oven

Fig. 1: Overview: The example here is a high-temperature furnace, Model HTCT 01/.. with accessories

1.3 Key to the Model Names

Example	Explanation
HTCT 01/16	**HTCT** = high-temperature furnace (tabletop model)
HTCT **01**/16	**01** = 1-liter furnace chamber (volume in L)
HTCT 01/**16**	**14** = Tmax 1400 °C (2552 °F) **15** = Tmax 1500 °C (2732 °F) **16** = Tmax 1600 °C (2912 °F)

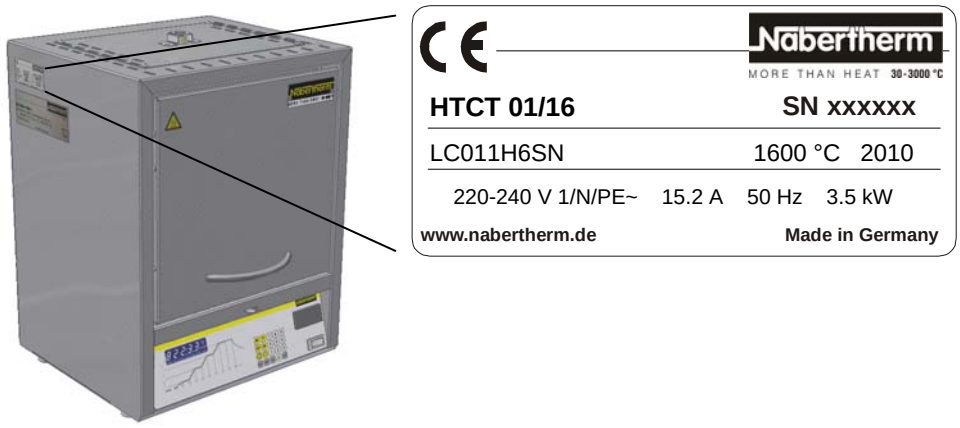
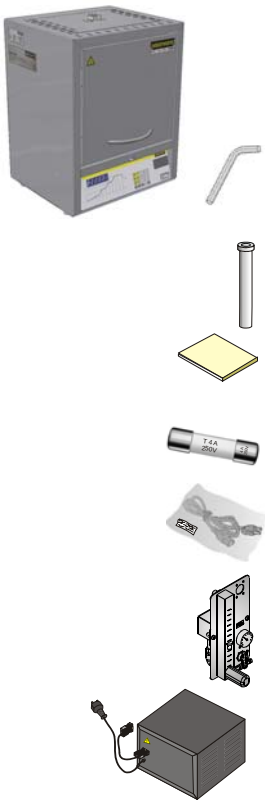


Fig. 2: Example model designation (type plate)

1.4 Scope of Delivery

The scope of supply includes:



System component	Quantity	Comment
HTCT ../.. high-temperature furnace (tabletop model)	1 x	Nabertherm GmbH
Allen key	1 x	Nabertherm GmbH
Exhaust air pipe	1 x	Nabertherm GmbH
Insert plate	1 x	Nabertherm GmbH
Fuse *)	1 x *)	Nabertherm GmbH
Mains power cable *)	1 x	Nabertherm GmbH
Gas supply system *)	1 x	Nabertherm GmbH
Tansformer *)	1 x	Nabertherm GmbH
Other components depending on variant	- - -	See delivery documents

Type of document	Quantity	Comment
Operating instructions, HTCT ../.. high-temperature furnace (tabletop model)	1 x	Nabertherm GmbH
Operating instructions, controller *)	1 x	Nabertherm GmbH
Operating instructions, gas supply system *)	1 x	Nabertherm GmbH
Other documents depending on variant	- - -	

*) = in scope of delivery depending on variant

Note

Please carefully retain all documents. During fabrication and before delivery, all the functions of this furnace system have been tested.

2 Specifications

Electrical specifications are on the type plate located on the side of the oven.

High-temperature furnace

Model	Tmax °C	Dimensions, interior in mm w	d	h	Dimensions, exterior in mm W	D	H+c	Volume in L	Output kW	Weight kg	Minutes to Tmax
HTCT 01/14	1400	110	120	120	340	300	500+185	1	max. 3.5	25	40
HTCT 01/15	1500	110	120	120	340	300	500+185	1	max. 3.5	25	50
HTCT 01/16	1600	110	120	120	340	300	500+185	1	max. 3.5	25	60

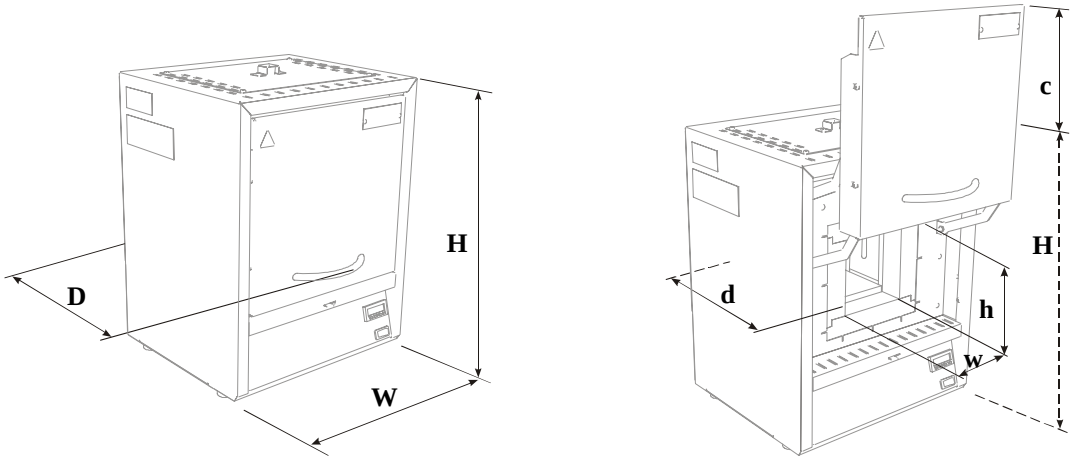


Fig. 3: Dimensions of high-temperature furnace

Electrical connection		1-phase: (1/N/PE)
	Model:	HTCT 01/14 – HTCT 01/16
	Voltage:	220 V – 240 V
	Frequency:	50 or 60 Hz
	Power plug	Protective contact plug (with snap-in socket)
Thermal protection class	Furnaces:	**As per DIN EN 60519-2** Without safety controller: Class 0
Protection class	Furnaces	IP20
Ambient conditions for electrical equipment	Temperature: Humidity:	+5°C to + 40°C, max. 80% non-condensing
Emissions	Continuous sound pressure level:	< 80 dB(A)

2.1 Warranty and Liability

§

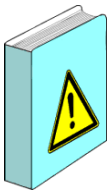
As regards warranty and liability, the normal Nabertherm warranty terms apply, unless individual terms and conditions have been agreed. However, the following conditions also apply:

Warranty and liability claims for personal injury or damage to property shall be excluded if they are attributable to one or more of the following causes:

- Everyone involved in operation, installation, maintenance, or repair of the oven must have read and understood the operating instructions. No liability will be accepted for damage or disruptions to operation resulting from non-compliance with the operating instructions.
- Not using the oven as intended,
- Improper installation, start-up, operation, or maintenance of the oven,
- Operation of the oven with defective safety equipment or improperly installed or non-functioning safety and protective equipment,
- Not observing the references in the operating instructions to transportation, storage, installation, start-up, operation, maintenance, or equipping the oven,
- Making unauthorized changes to the oven,
- Making unauthorized changes to the operating parameters,
- Making unauthorized changes to the parameterization, the settings, or the program,
- Original parts and accessories are designed especially for Nabertherm ovens. Replace parts only with original Nabertherm parts. Otherwise the warranty will be void. Nabertherm accepts absolutely no liability for damage caused by using parts that are not original Nabertherm parts.
- Catastrophes due to third-party causes and force majeure.

3 Safety

3.1 Intended Use



This Nabertherm system was designed and manufactured after careful selection of the harmonized standards to be observed as well as other technical specifications. It therefore corresponds to the state of the art, ensuring the highest possible degree of safety.

Only materials with known characteristics and melting temperatures may be used. Check the material safety data sheets if necessary.

Use of the furnace for any other purpose whatsoever such as processing products other than those intended or handling hazardous substances or substances posing a health hazard constitutes improper use and must be agreed upon with Nabertherm in writing.

Whether or not the materials used in the furnace can potentially corrode or destroy the insulation or heating elements must be ascertained.

For furnaces with over-temperature limit controllers, the cutoff temperature must be set to prevent overheating of the material.

Modifications to system equipment must be agreed upon with Nabertherm in writing. It is not permitted to remove, bypass, or shut down safety devices.

The installation instructions and safety guidelines must be observed. Otherwise, the furnace will not be considered as being used as designated, and all claims against Nabertherm GmbH will be void.

Opening the furnace when hot (temperature greater than 200/392 °C/°F) can lead to accelerated wear of the following components: insulation, heating elements, and furnace housing.

Operating with power sources, products, operating equipment, additives, etc. that are subject to the Ordinance on Hazardous Substances or cause risks to the health of operating personnel in any way is not permitted.

- This furnace is designed for **commercial** use. The furnace must **not** be used for heating food, animals, wood, grain, etc.
- The furnace must not be used as a workplace heater.
- Do not use the furnace to melt ice or similar materials.
- Do not use the furnace as a clothes dryer.

Note

See safety instructions in the individual sections.

Note

The oven must not be operated with explosive gases or mixtures and it must be ensured that explosive gases or mixtures do not form during the process.

This oven has **no** safety technology for processes in which ignitable mixtures could form, e.g. debinding.

If the oven is to be used for such processes, the concentration of organic gases must never exceed 3% of the lower explosive limit (LEL) in the oven. This requirement not only applies to normal operation, but also especially to exceptions, such as process faults (e.g. due to the failure of a unit, etc.).

Nabertherm offers a wide range of ovens and furnaces that were especially developed for

processes with ignitable gases.

Note

This product does **not** comply with the ATEX Directive and may **not** be used in ignitable atmospheres. It must not be operated with explosive gases or mixtures or during processes where explosive gases or mixtures are produced.

3.2 Requirements for the Oven Operator

The set-up instructions and safety regulations must be followed, otherwise the oven will be deemed to have been used improperly, effectively cancelling any claims against Nabertherm GmbH.

This level of safety when operating the oven can be achieved only if all the necessary measures have been taken. It depends on the oven operator's diligence in planning these measures and controlling how they are carried out.

The operator must ensure that

- all harmful gases are removed from the workplace, for example by an extraction system,
- the extraction system is switched on,
- the workplace is properly ventilated,
- the oven is operated only in a perfect operating condition and, in particular, that the functions of the safety components are checked regularly.
- the required personal protective equipment is available for and used by the operating, maintenance, and repair personnel.
- these operating instructions, including the supplier documentation, are kept near the oven. These instructions must be available at all times for anyone working with or on the oven;
- all the safety and operating instruction signs on the oven can be read properly. Damaged or unreadable signs must be replaced immediately,
- oven personnel are informed regularly about all issues involving occupational safety and environmental protection and are familiar with all the operating instructions, especially those involving safety,
- a risk assessment is carried out (in Germany, covered by Section 5 of the Occupational Safety Act) to determine any other hazards that may result from the working conditions particular to the oven's location,
- all other instructions and safety guidelines that have been determined in a risk assessment for the workplace are compiled in an operation manual (in Germany, covered by Section 6 of the Ordinance Regulating the Use of Operating Equipment).
- operating personnel still in training initially perform their work at the oven under the supervision of an experienced person. Successful completion of the training period must be confirmed in writing.

Note

In Germany, the VBG and BGZ accident prevention regulations must be followed. The accident prevention regulations applicable in the country where the oven is installed must be followed.

3.3 Requirements for the Operating Personnel

The oven may be operated only by persons who are trained, instructed, and authorized to do so. These persons must know the operating instructions and act accordingly. The authorizations of the operating personnel must be clearly defined.

Only adequately qualified and authorized persons may operate, maintain, or repair the oven.

Operating personnel are instructed regularly in all aspects of occupational safety and environmental protection and are familiar with all the operating instructions, in particular, safety instructions.

Only trained personnel may operate the control and safety equipment.

The operator should complete these details:

- Operator_____
- The oven may only be transported by _____
- The oven may only be installed by _____
- The oven may only be commissioned by_____
- Initial instructions may only be given by_____
- Faults may only be rectified by _____
- The oven may only be maintained by _____
- The oven may only be cleaned by _____
- The oven may only be serviced by _____
- The oven may only be repaired by _____
- The oven may only be shut down by _____

3.4 Protective Clothing

Wear heat-resistant gloves to protect your hands.

3.5 Basic Measures During Normal Operation

Risks during Normal Operation!

Before switching the oven on, check and ensure that only authorized persons are in the working area of the oven and that no one can be injured as a result of operating the oven.

Before starting production each time, check and ensure that all the safety equipment works properly.

Before starting production each time, check the oven for obvious damage and ensure that it is operated only in a perfect condition. Report any defects to a supervisor immediately.

Before starting production each time, remove all materials and objects that are not needed for production from the working area.

At least once every day (see also Servicing and Maintenance) check the following:

- Check the oven for obvious external damage,
- Check that all safety equipment is working as intended (e.g. emergency stop button),

- Check all hydraulic or pneumatic hoses, make sure that they are not leaking and that they are connected properly (if applicable),
- Check all gas and oil lines, make sure that they are not leaking and that they are connected properly (if applicable),
- Check that the fan works properly,

3.6 Basic Measures in Case of Emergency

3.6.1 What to do in an Emergency

Note

The power plug is to be pulled out to stop the oven in case of an emergency. Therefore, the power plug must be accessible at all times when the oven is operating so that it can be pulled out quickly in case of an emergency.

Fig. 4: Pulling the power plug

Risks during Normal Operation!

Switch the oven off immediately in case of unexpected occurrences in the oven (e.g. a lot of smoke or unusual smells). Wait until the oven has cooled naturally to room temperature.

	DANGER • **Danger of electric shock.** • **Risk of fatal injury.** • Work on electrical equipment may be carried out only by qualified electricians or by trained personnel authorized by Nabertherm. • Before starting work, pull out the power plug	

3.7 Basic Measures for Servicing and Maintenance

Maintenance work must be performed by authorized persons following the maintenance instructions and the accident prevention regulations. We recommend that the maintenance and repair work be carried out by the service team of Nabertherm GmbH. Non-compliance may cause injuries, death, or considerable damage to property.

Switch off the oven and make sure it cannot be switched on again inadvertently (lock the main switch and secure it with a padlock), or pull out the power plug.

Clear an adequate area around the oven to facilitate the repair work.

Suspended loads are dangerous. Working beneath a suspended load is prohibited. There is a risk of fatal injury.

Relieve the pressure on hydraulic equipment before carrying out maintenance or repair work (if applicable).

When cleaning ovens, control cabinets, or electrical equipment housings, never spray them with water.

When maintenance or repair work has been completed, before recommencing production ensure the following:

- Check that loosened screw connections have been re-tightened,
- Reinstall protective equipment, screens, and filters,
- Remove all material, tools, and other equipment used for the maintenance or repair work from the working area of the oven,
- Remove any liquids that have leaked,
- Check that all safety functions (e.g. emergency stop button) work properly,

Power cables may be replaced only with similar, approved cables.

3.8 Environmental Regulations

All statutory duties regarding waste avoidance, proper recycling, and disposal must be observed when work is carried out on and with the oven.

Problem materials that are no longer needed, such as lubricants or batteries, must not be placed in normal waste disposal systems or allowed to enter the sewage system.

During installation, repair, and maintenance work, substances that are hazardous to water, such as

- lubricating grease and oils
- hydraulic oils
- refrigerants
- solvent-based cleaning fluids must not be allowed to contaminate the soil or enter the sewage system.

These substances must be stored, transported, collected, and disposed of in suitable containers.

Note

The operator must ensure that national environmental regulations are observed.

When it is delivered, this oven contains no substances that make a hazardous waste classification necessary. However, residues of process materials may accumulate in the oven insulation during operation. These may be hazardous to health and/or the environment.

- Dismantle the electronic components and dispose of them as electric scrap.
- Remove the insulation and dispose of it as hazardous waste (See Servicing, Cleaning, and Maintenance with Ceramic Fiber Material)
- Dispose of the housing as scrap metal.

3.9 Explanation of the Symbols and Warnings

Note

In the following operating instructions, specific warnings are given to draw attention to residual risks that cannot be avoided when the oven is operating. These residual risks include dangers for humans/products/ the oven, and the environment.

The symbols used in the operating instructions are especially intended to draw attention to safety information.

The symbols used cannot replace the text of the safety information. Therefore, always read the entire text.

Graphic symbols correspond to **ISO 3864**. In accordance with the **A**merican **N**ational **S**tandard **I**nstitute (ANSI) **Z535.6** the following warning information and words are used in this document:

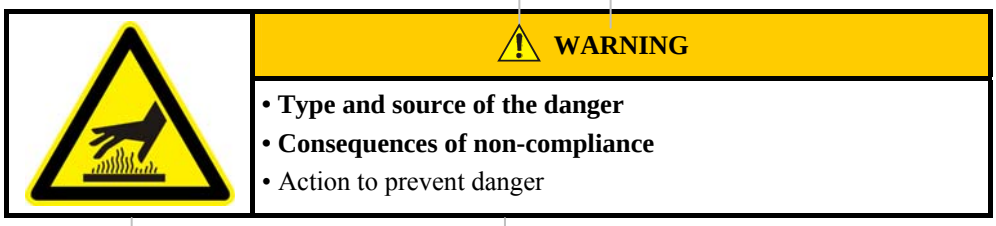
The general hazard symbol, in combination with the words **CAUTION**, **WARNING** and **DANGER** warns about the risk of serious injury. Observe the following information to prevent injury or death.

NOTICE	Refers to a hazard that could damage or destroy the equipment.
CAUTION	Refers to a hazard with a minor or medium risk of injury.
WARNING	Refers to a hazard that could cause death, serious or irreversible injury.
DANGER	Refers to a hazard that could directly cause death, serious or irreversible injury.

Structure of the warning: All warnings are structured as follows

Hazard symbol
Indicates the risk of injury

Signal word
Classifies the danger



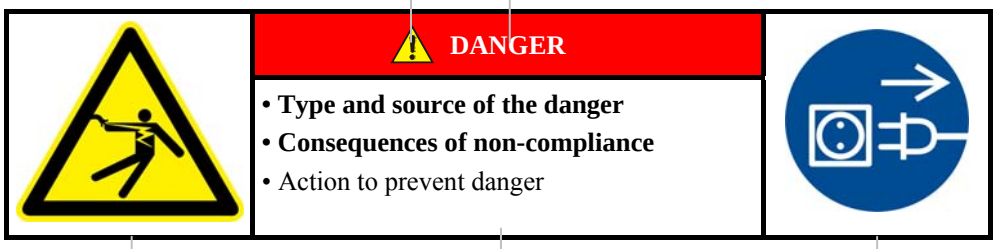
Graphical symbols (optional) according to ISO 3864:
Consequences, measures, and prohibitions

Reference texts:
• Type and source of the danger
• Possible consequences of non-compliance

or

Hazard symbol
Indicates the risk of injury

Signal word
Classifies the danger



Graphical symbols (optional) according to ISO 3864:
Consequences, measures, and prohibitions

Graphical symbols (optional) according to ISO 3864:
Instructions or prohibitions

Reference texts:
• Type and source of the danger
• Possible consequences of non-compliance
• Measures/prohibitions

Information Symbols in the Instructions:

▶ **Note**
Below this symbol you will find instructions and particularly useful information.

Rule - Rule Sign
This symbol draws attention to important rules that must be followed. Rule signs protect people against injury and show what is to be done in certain situations.

Rule - Important Information for Operators
This symbol draws the operator's attention to important information and operating instructions that must be followed.

Rule - Important Information for Maintenance Personnel
This symbol draws the maintenance personnel's attention to important operating and maintenance instructions (service) that must be followed.

Rule - Pull Out the Power Plug
This symbol tells the operator to pull out the power plug.

Rule - Lift only with Several People
This symbol draws the personnel's attention to the fact that this device may only be lifted and moved to its final destination by several people.

Warning - Hot Surface, Do Not Touch
This symbol warns the operator that the surface is hot and should not be touched.

Warning - Danger of Electric Shock

This symbol warns the operator that there is a risk of an electric shock if the following warnings are not heeded.

Warning – Risk of Device Toppling Over

This symbol tells the operator that there is a risk of the device toppling over if the following warnings are not heeded.

Warning – Suspended Load

This symbol warns the operator of potential dangers of suspended loads. Working below a suspended load is strictly forbidden. Ignoring this can lead to fatal injury.

Warning – Danger if Heavy Loads Are Lifted

This symbol warns the operator of the potential dangers of lifting heavy loads. Ignoring this can lead to injury.

Warning – Risk to the Environment

This symbol warns the operator of the risk to the environment if the following information is not heeded. The operator must ensure that national environmental regulations are observed.

Warning - Fire Danger

This symbol warns operators of the danger of fire if the following information is not followed.

Warning – Risk of Explosive Substances or Explosive Atmosphere

These symbols warn the operator of explosive substances or an explosive atmosphere

Prohibited - Important Information for Operators

This symbol warns the operator that water or cleaning products must NOT be poured over the objects. A high-pressure cleaning device must also not be used.

Warning Signs on the Oven:

Warning - Hot Surface, Danger of Burning – Do Not Touch

You may not always realize that surfaces, such as oven components, oven walls, doors and materials, and even liquids are hot. Do not touch the surface.

Warning - Danger of Electric Shock!

Warning, dangerous electric voltage

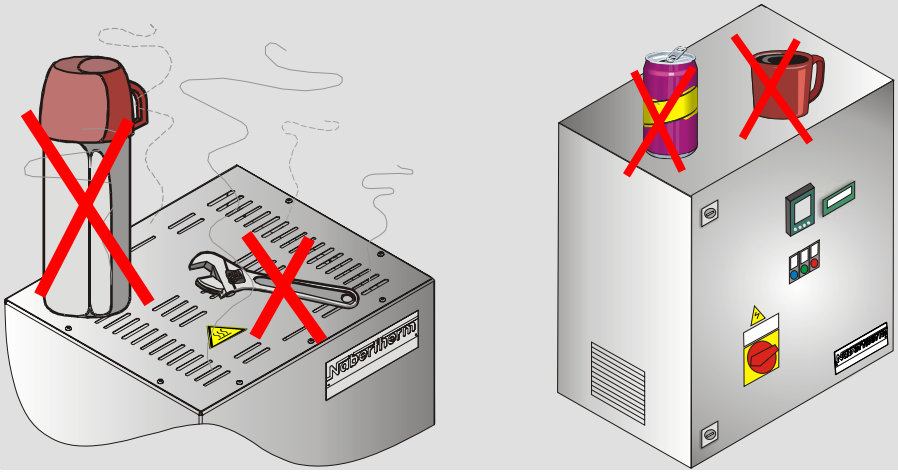
3.10 General Risks with the Oven

Warning! General hazards!

- Risk of burning on the furnace housing and on the tube
- The door handle/grip can become very hot during operation; wear gloves.
- Risk of crushing on moving parts (door hinge, rotary tube drive, lifting table, etc.)
- The switchgear cabinet (if present) and the terminal boxes on the system contain dangerous electrical voltages.
- Do not insert any objects into the openings on the furnace housing, exhaust air holes, or cooling slots on the switchgear or furnace (if present). This poses a risk of electric shock.

Warning! General hazards!

No objects may be placed or set down on the furnace or switchgear. Doing so creates a fire or explosion hazard.



4 Transportation, Installation, and Commissioning

4.1 Delivery

Check that Everything is Complete

Compare the delivered items with the delivery note and the purchase order documents. **Immediately** notify the carrier and Nabertherm GmbH of any missing or damaged parts, as complaints at a later date cannot be acknowledged.

Danger of Injury

When the oven is being lifted, parts of the oven or the oven itself could topple over, slip, or fall. Before the oven is lifted, make sure no one is in the working area. Wear safety footwear and a hard hat.

Safety Instructions

- Forklifts must be operated only by authorized personnel. The operator bears sole responsibility for safe operation and the load.
- When the oven is being lifted, make sure that the ends of the forks or the load do not catch on neighboring goods. Use a crane to move tall parts, such as control cabinets.
- Use only lifting equipment with sufficient load-bearing capacity.

- Lifting gear must be attached only to positions that have been designated for this purpose.
- Attachments, piping, or cable conduits must never be used to affix lifting gear.
- Unpackaged parts should only be lifted with ropes or straps.
- Attach transportation equipment only to positions intended for this purpose.
- Lifting and securing equipment must conform to the provisions contained in accident prevention regulations.
- Consider the weight of the oven when choosing lifting and securing equipment. (see Specifications)
- Stainless steel parts (including mounting elements) must always be kept separate from unalloyed steel parts.
- Do not remove corrosion protection until immediately prior to assembly.

Risks during Normal Operation!

Suspended loads are dangerous. Working beneath a suspended load is prohibited. There is a risk of fatal injury.

Note

Safety and accident prevention guidelines applicable for forklift trucks must be followed.

Transportation with a Pallet Truck

Observe the maximum permitted capacity of the pallet truck.

1. Our ovens are delivered ex works on wooden frames to facilitate unloading. Transport the oven in its original packaging and with suitable equipment to prevent any damage. Remove the packaging only when the oven is in its final location. When transporting the oven, make sure it is secured against sliding, toppling over, and damage. The oven should be transported and installed by at least two persons. Do not store the oven in damp rooms or outdoors.
2. Push the pallet truck underneath the transportation frame. Make sure that the pallet truck is **completely** beneath the frame. Pay attention to neighboring goods.

Fig. 5: Pallet truck is pushed **completely** beneath the transportation frame

3. Lift the oven carefully and pay attention to its center of gravity. When the oven is being lifted, make sure that the ends of the forks or the load do not catch on neighboring goods.
4. Make sure that the oven is balanced safely; if not, attach securing equipment. Push the oven carefully, slowly and with the pallet truck at its lowest position. Do not transport the oven on inclines.

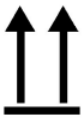
5. Carefully lower the oven at its final position. Pay attention to neighboring goods. Try not to set it down too abruptly.

⚠ CAUTION

- **Device may slip or topple over.**
- **Damage to the device.**
- Risk of injury from lifting heavy loads.
- Transport device only in original packaging.
- Several people must carry the device.

Symbols:

The international standard symbols for handling packaging are defined in ISO R/780 (International Organization for Standardization) and in DIN 55 402 (German Institute for Standardization).

Description	Symbol	Explanation
Fragile		This symbol is to be attached to fragile goods. Goods marked like this are to be handled carefully and must not be thrown or tied up.
This side up		The freight must be transported, transshipped, and stored in such a way that the arrows point upward. The freight must not be rolled, folded, or stored on edge. However, the package does not have to be packed on top of other freight.
Keep dry		Products with this symbol must be protected against high air moisture, hence, they must be stored under cover. If particularly heavy or bulky packages cannot be stored in halls or sheds, they must be covered carefully with a tarpaulin or similar.
Sling here		The symbol shows only where the sling should be attached, not the method of slinging. If the symbols are at an equal distance from the middle or center of gravity of the package, the package hangs straight if the slings are the same length. If this is not the case, the sling on one side has to be shortened.

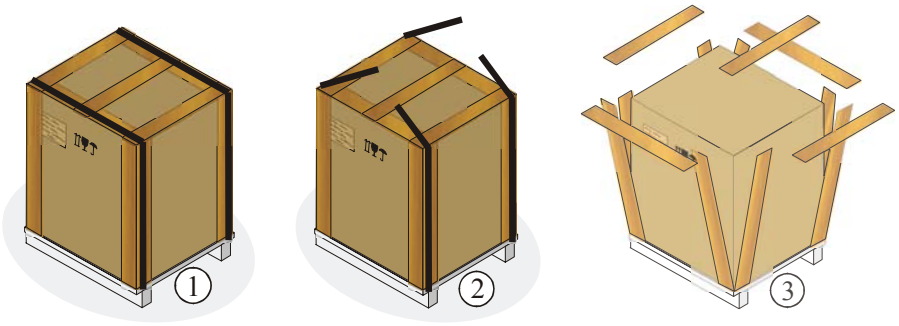
4.2 Unpacking

Note

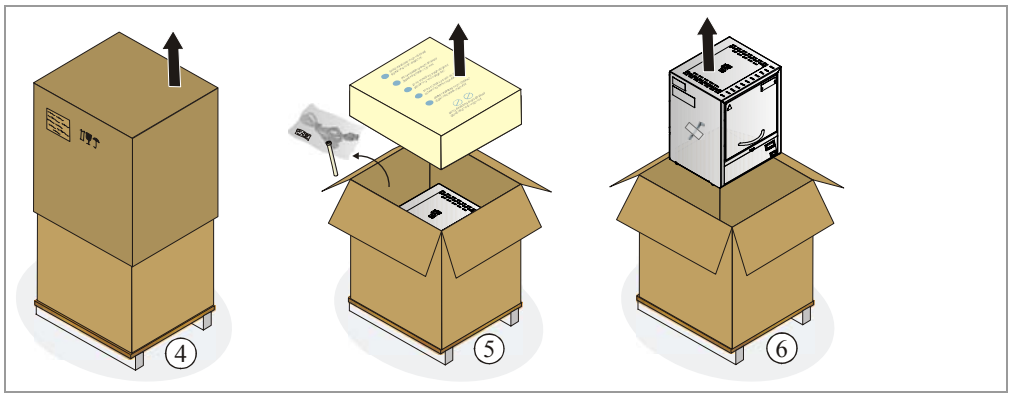
The oven packaging prevents damage during transportation. Make sure that you remove all packaging material (also inside the oven chamber). Keep the packaging and transportation securing equipment in case it is needed for future transportation or storage.

At least two people are needed to carry/transport the oven, more for larger ovens.

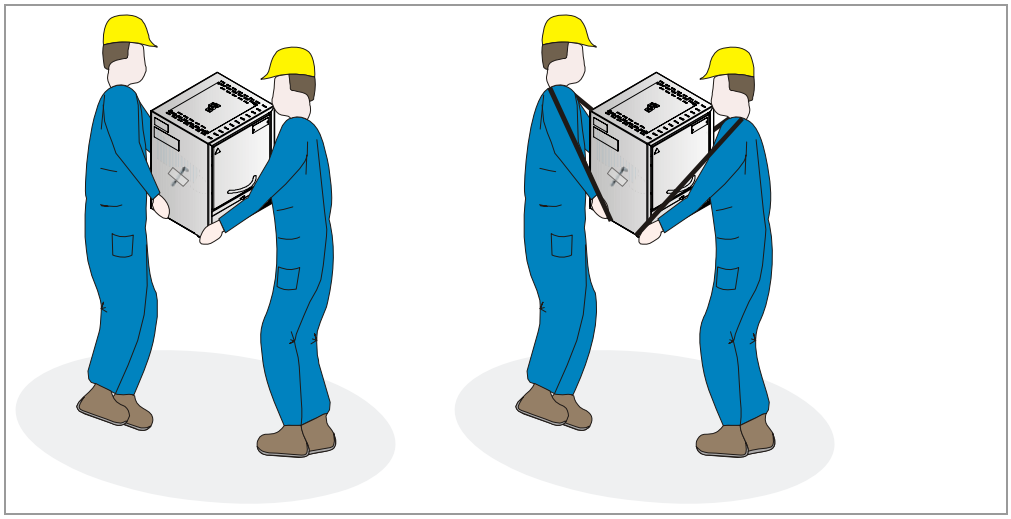
Wear protective gloves



1. Check the transportation packaging for possible damage.
2. Remove tensioning straps from the transportation packaging.
3. Slacken screws and remove wooden casing from the covering box (if available).



4. Carefully lift the cardboard box and remove it from the pallet.
5. Remove the foam insert in the box. The box contains a packaging unit for accessories (Example: exhaust air tube, insert plate, power cable). Compare the delivered items with the delivery note and the order documents, see "Delivery".
6. Carefully lift the furnace out of the packaging unit.



7. To carry, grip furnace from below at the sides and make sure you have a firm grip.
8. For furnaces weighing more than 25 kg, transport work must be carried out by at least 2 people. If transport straps are used, they must be attached crosswise only. Ensure that they are secure.

Note

In Germany, the general accident protection guidelines of VBG or BGZ must be observed. The national accident prevention regulations of the country of operation apply.

Note

Save the packaging for possible shipping or for storing the furnace.

4.3 Transportation Securing Equipment/Packaging

The oven packaging prevents damage during transportation. Make sure that you remove all packaging material (also inside the oven chamber). All packaging material can be recycled. The packaging was designed so that no special description is necessary.

The furnace has been equipped with protective edging to protect it against damage during transportation. This edging must be removed before you operate the furnace.

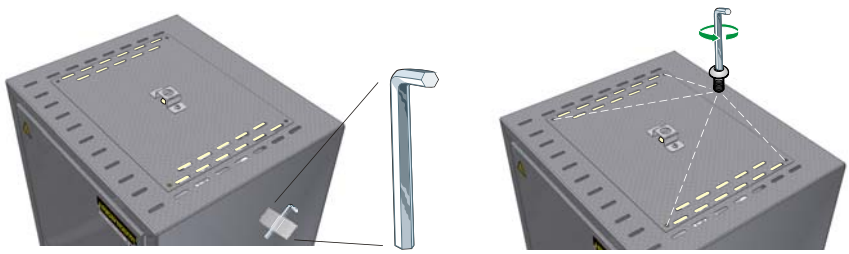


Fig. 6: Unscrew the screws from the lid using the tool that is provided.

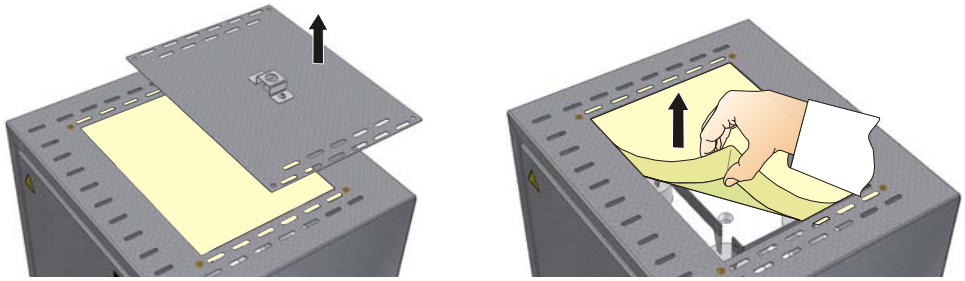


Fig. 7: Lift the lid and remove the foam.

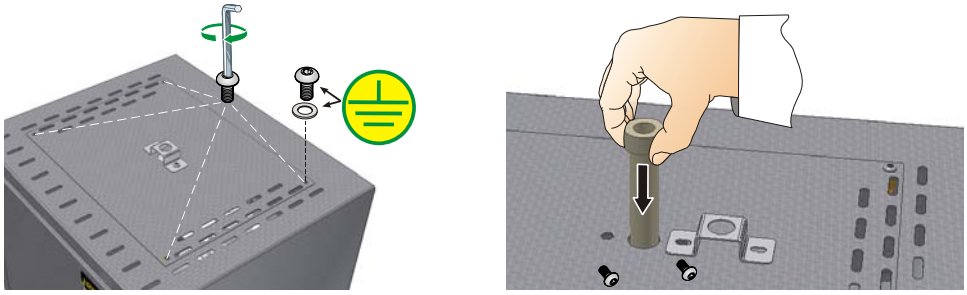


Fig. 8: Fix the lid back in place using the screws that you previously unscrewed. Make sure that you place a tooth lock washer between the screw and the lid. This position is marked by a ground sticker on the housing/lid. Loosen the protective metal sheet of the exhaust air tube from the lid. Carefully slide the exhaust air tube into the intended opening. The top of the exhaust air tube must sit on the lid.

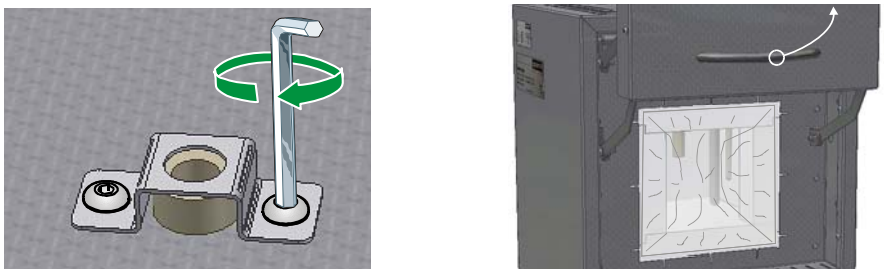


Fig. 9: Assemble the protective metal sheet of the exhaust air tube with the screws that you previously unscrewed.
Open the lift door and remove the protective foil from the furnace chamber.

Note

Keep the transport protection in case you have to ship the furnace. To prevent damage to the heating elements during any future transportation, the furnace must be prepared as shown in picture above.

4.4 Constructional and Connection Requirements

4.4.1 Installation (Oven Location)

When setting up the furnace, the following safety instructions must be followed:

- The furnace must be installed in a dry room in accordance with the safety instructions.
- The table/supporting surface must be flat to enable the furnace to be installed straight. The furnace must be placed on a **noncombustible** base (stone, metal, etc.).
- The carrying capacity of the table must be designed to bear the weight of the furnace incl. accessories.
- The floor covering must be made of nonflammable material so that hot material falling out of the furnace will not cause the floor covering to ignite.

Despite good insulation, the furnace radiates heat from its external surfaces. If necessary, this heat must be conducted away (**a ventilation engineer must be consulted if required**). In addition, the furnace must be positioned a minimum safety distance (S) of 0.5 m on each side and 1 m at the top away from combustible materials. In individual cases, more space must be chosen in order to match the local conditions. The minimum distance away from **noncombustible materials** may be reduced to 0.2 m at the **sides**.

Should gases or vapors escape from the charge, then sufficient air supply and ventilation at the installation location or an appropriate exhaust gas line must be provided.
A suitable exhaust for the burner exhaust must be provided by the customer.

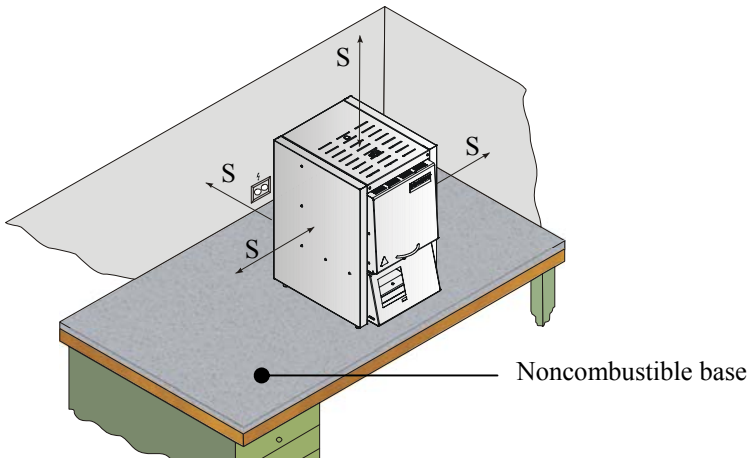


Fig. 10: Installation of an high-temperature furnace

DANGER

- **Fire- danger to health.**
- **Risk of fatal injury.**
- Adequate ventilation must be ensured at the installation location to conduct waste heat and any exhaust gases away.

Note

Before starting the oven for the first time, allow it to acclimatize at its installation location for 24 hours.

4.5 Assembly, Installation, and Connection

4.5.1 Waste Gas System

We recommend that an exhaust air pipe be connected to the furnace and that the exhaust gases be conducted away accordingly.

A commercially available metal exhaust gas pipe with NW80 to NW120 may be used as a flue. It must be routed in constantly ascending form and must be secured to the wall or ceiling.

Position the pipe centrally above the furnace's flue outlet. The exhaust gas pipe's connection to the exhaust air pipe must not be airtight, as no bypass effect is otherwise achieved. This is necessary to prevent an excessive amount of fresh air from being sucked through the furnace.

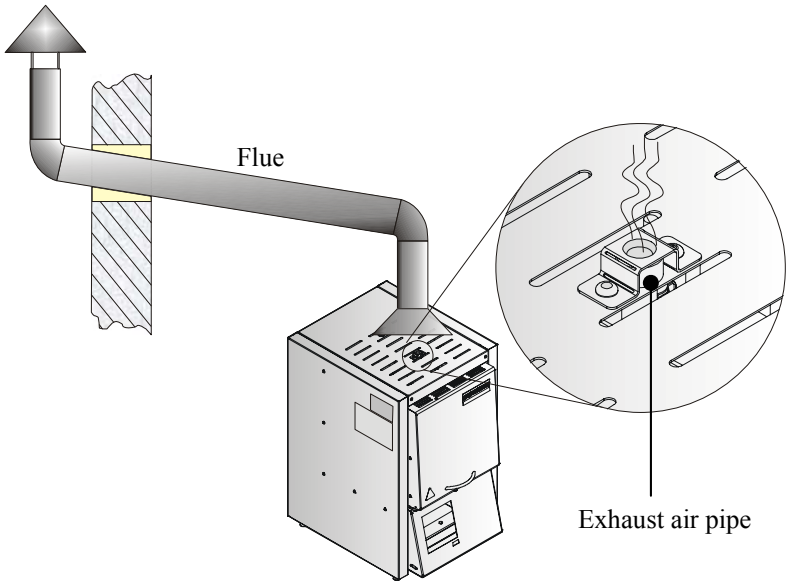


Fig. 11: Assembly of a flue (example)

Note

The exhaust gases can only be conducted away if the room is ventilated via a corresponding air inlet.

Note

The exhaust gas pipe necessitates roofing and bricklaying work on the part of the customer. The size and variant of the exhaust gas pipe should be determined by a ventilation engineer. The national regulations of the relevant country apply.

4.5.2 Connecting the Oven to the Power Supply

On the building side, the required services must be provided, i.e. the carrying capacity of the installation surface, provision of power (electricity), etc.

- The furnace must be installed in accordance with its intended use. The power connection values must correspond to the values on the furnace type plate.
- The power socket must be located close to the furnace and must be easily accessible. The safety requirements are not met if the furnace is not connected to a socket with grounding contact.
- On use of an extension cable or a multipoint socket, the maximum electrical rating must not be exceeded. Do not use the furnace with an extension cable if you are uncertain whether grounding is guaranteed.
- The power cable must not be damaged. Do not place any objects on the power cable. Route the cable so that nobody can tread on or stumble over it.
- A damaged power cable must be replaced immediately.
- Ensure that the furnace's connection cable is routed so that it is protected.

Note

Before connecting the voltage supply, make sure that the power switch is in the "**Off**" or "**0**" position.

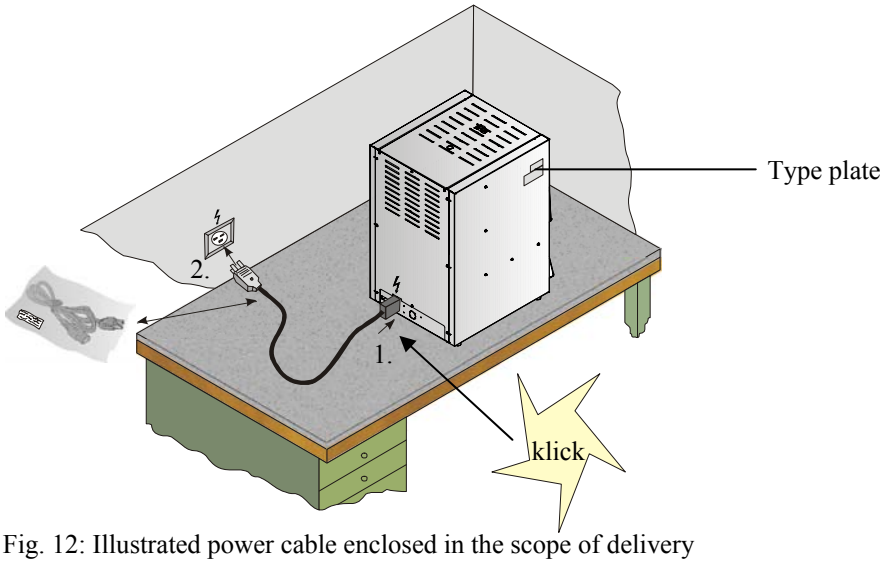


Fig. 12: Illustrated power cable enclosed in the scope of delivery

1. First connect the enclosed power cable to the intended mains power connector on the furnace.
2. Now connect the enclosed power cable to the power connection. Only use a socket with grounding contact to supply power.

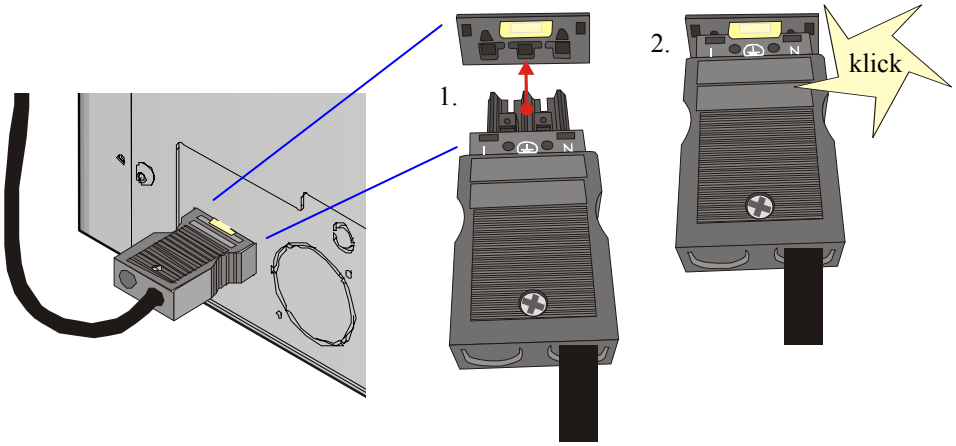


Abb. 13: Reconnect the power cable

Note

For wiring and electrical connections, see the attached circuit diagram. The electrical equipment of the machine can also be seen in the circuit diagram.

	NOTICE	
	• **Danger from incorrect voltage** • **Damage to the oven.** • Check voltage before connecting and commissioning the oven. • Compare the voltage with the details on the type plate.	

4.5.3 Installation/Connection if a Transformer is Used

When you are installing a transformer, these safety instructions must be followed:

- **The transformer is intended for use only with the model of furnace that is delivered (see delivery note). If the transformer is used for any other purpose, this is deemed to be inappropriate use.**
- Check the device for damage regularly and before using it for the first time. If it is damaged (cable, plug or housing), it must not be used. Power cables may be replaced only with similar, approved cables.
- Operate only in dry, clean rooms at maximum 40 °C (104 °F).
- The bench/surface must be level to permit the transformer and the furnace to stand upright. Place the transformer on a **non-flammable** surface (stone, metal, etc.).
- For the surrounding safety distance, see "Installation (Oven Location)".
- The load-bearing capacity of the bench must be suitable to take the weight of the transformer/furnace plus accessories.
- Isolate the device from the power supply when it is being cleaned or maintained. Do not open the device while it is operating.

Technical Specification for Transformer	Input	Output
Voltage	200 V – 208 V ~ AC	230 V ~ AC
Frequency	50 or 60 Hz	50 or 60 Hz
Max. output	3.5 kW	3.5 kW
Power plug	Country-specific	
Standards	EN 61558-1, Protection type I / IP 20 UL + CSA E300981	
Dimensions in mm	120 x 140 x 145 (W x D x H)	

The transformer is packaged carefully to prevent damage during transportation. Make sure that you remove all the packaging material. Then carefully place the furnace Ⓐ on to the transformer housing Ⓑ (see figure below).

Connect the furnace and the transformer with the power cable that is supplied ① (cable with snap-in coupling). Connect the power cable from the transformer to the power supply. ②. Use only a grounded socket.

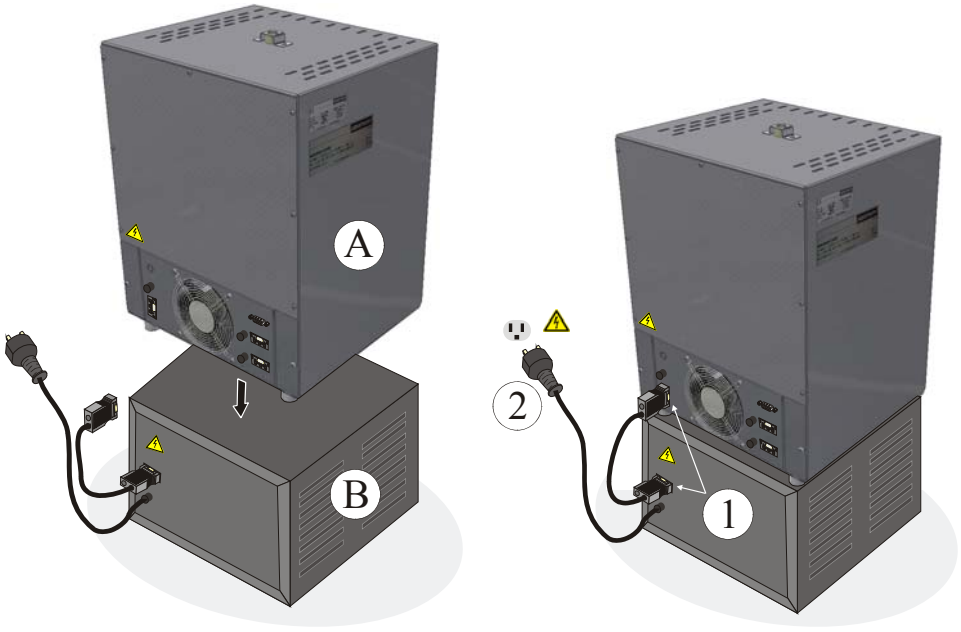


Fig. 14: Installing/connecting a transformer

⚠ DANGER

- **Fire- danger to health.**
- **Risk of fatal injury.**
- Adequate ventilation must be ensured at the installation location to conduct waste heat and any exhaust gases away.

4.5.4 Insertion of the Base Plate

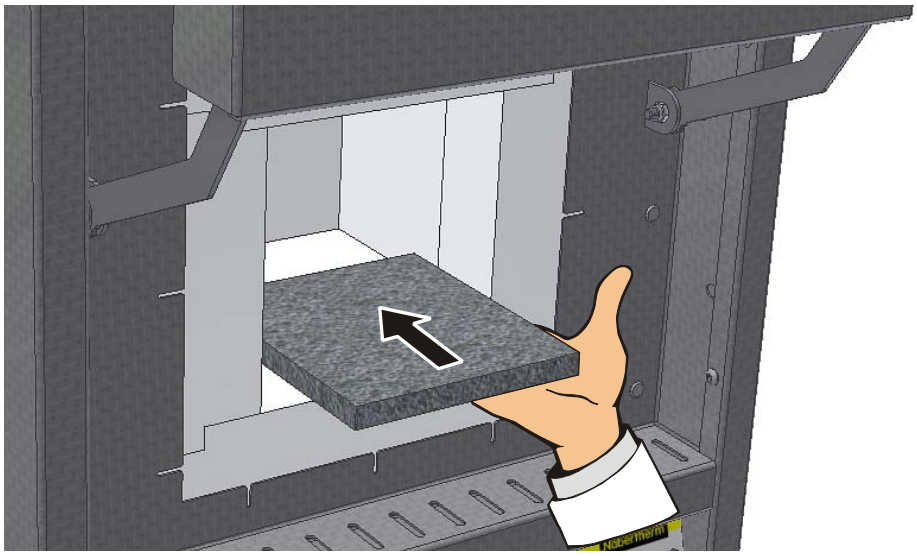


Fig. 15: Inserting the ceramic insert plate

Swivel the furnace lift-door carefully away upwards. Carefully place the ceramic insert plate/s (quantity of insert plates dependent on furnace model) centrally on the base of the furnace. When inserting the ceramic insert plate/s, ensure that the door collar and the heating elements are not damaged. Under all circumstances, avoid coming into contact with the heating elements when inserting the insert plate/s; this may lead to the immediate destruction of the heating elements.

The base of the furnace is manufactured from high-quality, fireproof material which is extremely sensitive to impact. The ceramic insert plate has the task of protecting the base of the furnace. Damaged insert plate/s must be immediately replaced with new ones (see chapter entitled "Replacement/Wearing Parts").

The furnace must not be commissioned without the insert plate.

If possible, the load must be positioned centrally in the working chamber on the ceramic insert plate. This guarantees even heating.

After loading, the furnace lift-door must be closed carefully.

▶ **Note**

It must be ensured that the load on the furnace base does not exceed 2 kg.

4.6 Commissioning

The oven may be put into operation only by qualified persons and in compliance with the safety instructions.

Read the section on "Safety". When the oven is put into operation, the following safety information must also be observed to prevent serious injury, damage to the oven, and damage to other property.

Make sure that the instructions and information in the controller instructions are observed and followed.

The oven may be used only for its intended purpose.

Ensure that only authorized persons remain in the working area of the oven and that no other persons are put at risk when the oven is put into operation.

Before starting the oven for the first time, make sure that all tools, foreign parts, and transportation securing equipment have been removed.

Activate all safety equipment (power switch, emergency stop button if applicable) before putting the oven into operation.

Incorrectly wired connections may destroy electric/electronic components.

Observe the special protective measures (e.g. grounding, …) for components that are at risk.

Faulty connections can cause the oven to start unexpectedly.

Before you switch on the oven, make sure that you know what to do in case of faults or emergencies.

Before starting the oven for the first time, check the electrical connections and control displays.

Before placing materials in the oven, check whether they could harm or destroy the insulation or the heating elements. Materials that could damage the insulation include: alkalis, alkaline earths, metal vapors, metal oxides, chlorine compounds, phosphorous compounds, and halogens.

Note

Before starting the oven for the first time, allow it to acclimatize at its installation location for 24 hours.

4.7 Recommendations for Heating the Oven for the First Time

A special initial heating phase is not necessary for these heating elements installed in the furnace. You can begin immediately with the desired heating program.

During the heating, there may be a disturbing odor, due to the binding agent given off by the insulating material. We recommend ventilating the furnace location well during the first heating phase.

Tears in the insulation

The insulation of the furnace consists of a very high-quality refractory material. Heat expansion may cause tears in the insulation even after a few heating cycles. However, these have no effect on the functioning or quality of the furnace.

5 Operation

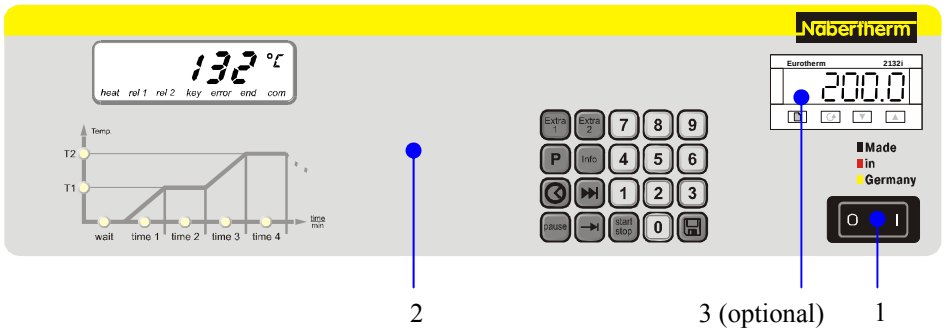


Fig. 16: Example: Controller

OFF/ON

1. The control current is switched off and on with the power switch (1). When the control current is switched on, the heating chamber temperature is shown in the LED display of the Controller (2).
2. The required heating and cooling programs are set on the Controller (2). See the separate instructions for a description of the controller.
3. The temperature of the over-temperature limit controller with manual reset (3) (optional) must be set 30°C (86°F) higher than the setting of the controller. For a description of the over-temperature limit controller, see the operating instructions for Controller B 180/P 330.

Note

Long-term operation at maximum temperature can lead to increased wear of the heating elements and door seal. We recommend that the oven is operated at about **50°C (122°F) below the maximum temperature**.

Note

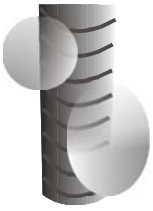
When you switch the oven on, check that the switchgear fan (rear of the oven) is working (you can hear a slight “humming” noise).

Note

See separate operating instructions for a description of Controller B 180/P 330.

Note

It is advisable not to switch the oven off as soon as the program is finished; instead allow it to cool naturally in circulation mode.



Note

During manufacturing residues of Silicium remain existant. At higher temperatures these result in fine glass bubbles at the surface of the heating element. The formation of these bubbles begins at tempera-tures above 1550 °C (2822 °F). Remove any existing bubbles carefully (with a brush or similar) before heating up the next time. This appearance is no background for a complaint.

5.1 Over-Temperature Limit Controller with Manual Reset and Adjustable Cut-Off Temperature

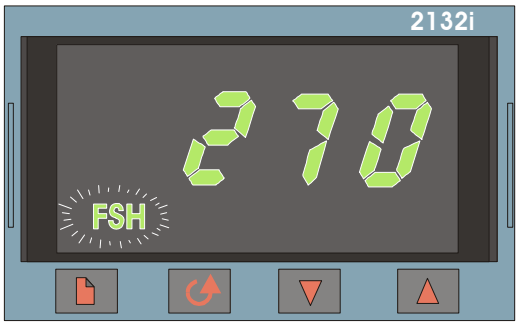


Fig. 17: Over-temperature limit controller with manual reset 2132i

Key	Description	Display
	The over-temperature limit controller with manual reset monitors the temperature in the oven chamber. The display shows the last trigger temperature that was set. If the temperature in the oven chamber exceeds the set trigger temperature, the heating is switched off to protect the oven and the load. "FSH" alarm flashes on the over-temperature limit controller.	**260 °C** **FSH**
	When the temperature in the oven chamber **falls below the value set on the over-temperature limit controller** , the following buttons have to be pressed to release the heating so that the oven can continue to operate:	
	Release heating:	
	Press and simultaneously. The alarm on the over-temperature limit controller is reset and this releases the heating.	
	Adjust the trigger temperature:	
	Set the required trigger temperature with the button (Example 270 °C) Increase the value with (260 … 269, 270) Reduce the value with (270 … 261, 260) To change the value quickly: hold the button depressed for longer. Wait 2 seconds until the new trigger temperature is integrated automatically (display flashes 1x). **Note:** Premature triggering of the over-temperature limit controller can be avoided if the difference between the adjustable temperature in the oven chamber and the trigger temperature is not below 10°C.	**270** **260**
	The display jumps back to the start screen showing the trigger temperature. The current trigger temperature is displayed. Entry finished.	**270 °C**
	For more information about operation, see the separate instructions for the Eurotherm 2132i	

	NOTICE
	• **Overheating** • **Damage to the batch** • If, as a result of excessive heat, a batch is likely to be damaged by the pre-set response temperature of the over-temperature limit controller with manual/automatic reset or if the batch itself becomes a source of danger for the oven or its surroundings, the temperature setting on the over-temperature limit controller with manual/automatic reset must be reduced to the maximum permissible value.

5.2 Air Inflow Lever

The volume of air fed to the furnace can be adjusted with the fresh air lever. The fresh air lever is located at the side of the door at the bottom. The position is explained by the symbols beside and on the lever.

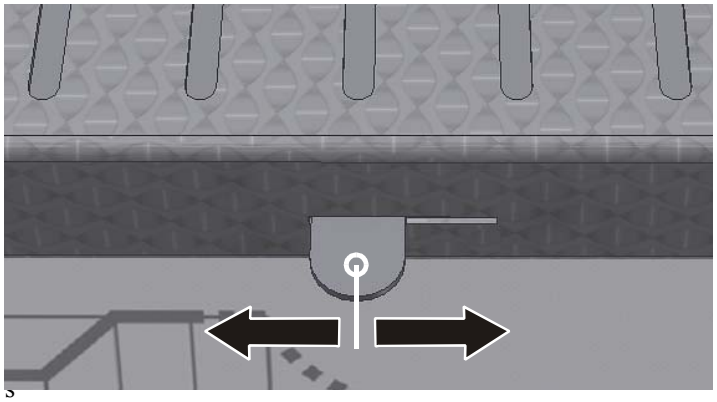


Fig. 1: Fresh air lever

Fig. 19: Regulating the feed of fresh air (symbols)

Note

If the fresh air lever is open, under certain circumstances this may affect temperature uniformity in the furnace chamber.

5.3 Loading/charging

Furnace loading

Swivel the furnace door carefully away upwards.

Only materials with known characteristics and melting temperatures may be used. Observe the material safety data sheets if necessary.

When loading the furnace, ensure that the door collar and the heating elements are not damaged. Under all circumstances, avoid coming into contact with the heating elements when loading the furnace; this may lead to the immediate destruction of the heating elements.

If possible, the load must be positioned centrally in the working chamber on the ceramic insert plate. This guarantees even heating.

If a large quantity of material is placed into the furnace chamber, the heating time may increase significantly.

If a crucible is used, make sure that the material to be melted is inserted carefully into the crucible. Crucibles are sensitive to shocks and impact. Metals expand more quickly and strongly than the crucible when heated. Be sure that the recommendations of the crucible manufacturer for maintenance and handling are carefully observed.

After loading, the furnace door must be closed carefully. The furnace door should be closed gently in order not to damage the insulation. Make sure that the door is closed correctly.

If possible, the furnace must **not** be opened when hot. If it has to be opened at a high temperature, this should take place as briefly as possible. Attention must be paid to adequate protective clothing and room ventilation, see chapter "Safety".

The stainless steel sheet may become discolored (particularly on opening when hot), but this does not impair the function of the furnace.

Additional care measures

Ensure that objects like teapots, bottles, and similar items are kept away from the furnace.

Warning - danger due to electrical current!

To protect the operator and the furnace, the heating program must always be stopped when the furnace is being loaded. There is a risk of electric shock on noncompliance.

6 Servicing, Cleaning, and Maintenance

Warning! General hazards!

Cleaning, lubrication, and maintenance tasks may only be performed by authorized experts following the maintenance instructions and accident protection guidelines. We recommend that maintenance and repair be performed by Nabertherm GmbH Service. Failure to comply runs the risk of bodily injury, death, or significant property damage!

Warning - danger due to electrical current!

Work on the electrical equipment may only be performed by qualified, authorized electricians!

During maintenance work, the voltage supply to the furnace and/or switching system must be switched off to prevent unintentional commissioning. Disconnect the mains power connector due to reasons of safety.

Operators may only correct malfunctions which are obviously due to operational error!

Wait until the furnace chamber and attaching parts have cooled to room temperature.

The furnace must be visually inspected at regular intervals for damage. The interior of the furnace must also be cleaned as required (e.g. vacuuming out) **Attention:** Do not bang against the heating elements to avoid breaking them.

While work is being performed on the furnace, the furnace and work room must additionally be ventilated with fresh air.

Safety systems removed during maintenance tasks must be replaced after the work.

Warning of swinging loads in the workshop (e.g. crane systems). Work under a lifted load (e.g. a lifted furnace or switching system) is not permitted.

Safety switches and any limit switches present must be checked for function periodically (BGV A3) or according to the national guidelines of the country of operation.

To ensure proper temperature regulation of the furnace, the thermocouple must be checked for damage before every process.

If necessary, retighten the element holders (see chapter "Replacing the Heating Element"). Before carrying out this work, the voltage supply to the furnace and/or switching system must be switched off (disconnect mains power connector). The regulations (BGV A3) or corresponding national regulations in the relevant country of operation must be observed.

There are one or more contactors in the control system. The contacts of these circuit breakers are wearing parts and must therefore be serviced and/or replaced regularly (BGV A3) or according to the national guidelines of the country of operation.

The switching system cabinet (if available) contains vent grilles with integrated filter mats. These must be cleaned and/or replaced at regular intervals in order to ensure sufficient intake and outflow of air from the switching system. During melting operation, the switching cabinet door must always be firmly closed.

This furnace contains ceramic fiber material in the insulation.

Active handling of these fibers (e.g., exchange of the insulation) in the Federal Republic of Germany is subject to the conditions of the Ordinance on Hazardous Substances, Annex V, No. 7 ("Artificial mineral fibers") of June 12, 1998. In the rest of the European Union, ceramic fibers are categorized as follows by Directive 97/69/EC of the Commission of December 5, 1997 CARC. Cat. 2; R 49; Xi R 38. Work with the fiber insulation must therefore be done in such a way that as little fiber dust as possible is released.

The following points must be noted when handling ceramic fiber:

- Dust development during processing should be minimized.
- Contact with skin and eyes should be avoided. The effects caused by fibers on the skin or in the eyes may cause mechanical irritation, as a result of which reddening and itching may occur.
- When processing large quantities of ceramic fibers, loose work clothing with long sleeves, gloves and safety glasses should be worn.
- When working with ceramic fiber insulation inside furnaces, a half/quarter mask with P2 filter should additionally be worn.

The furnace and its operating equipment must be regularly checked in accordance with the regulations of the employer's liability insurance association (BGV A3) or the corresponding national regulations in the relevant country of use!

6.1 Shutting the system down for maintenance

Warning! General hazards!

Cleaning, lubrication, and maintenance tasks may only be performed by authorized experts following the maintenance instructions and accident protection guidelines. We recommend that maintenance and repair be performed by Nabertherm GmbH Service. Failure to comply runs the risk of bodily injury, death, or significant property damage!

Wait until the furnace chamber and attached parts have cooled to room temperature

- The furnace must be completely emptied.
- Notify operating personnel and specify a supervisor.
- Switch off the main switch and disconnect the mains power connector.
- Lock the main switch and secure against restoration of power using a padlock.
- Attach a warning sign on the main switch.
- Seal off a large area around the servicing area.
- Check for disconnection of power.
- Ground and short-circuit the working area.
- Cover any nearby parts still under power.

Warning! General hazards!

Do not touch any object without first checking its temperature.

Warning - Danger of Electric Shock!

Work on the electrical equipment may be done only by qualified, authorized electricians. During maintenance work it must be ensured that the oven and the switching equipment cannot be activated by mistake (pull out the power plug) and that all moving parts in the oven are secured. Observe BGV A3 or the corresponding national regulations in the country where the oven is installed. Wait until the oven and the connected parts have cooled to room temperature.

6.2 Regular Maintenance of the Oven

Position/ Maintenance Point	Measure	Maintenance Interval					Operating	Qualified
		Day	Week	Month	Quarter	Year	Personnel	
Safety test in accordance with BGV A3 or corresponding national regulations	According to regulations	According to regulations						x
Safety and limit switches (if available)	Function test					●		x
Furnace chamber, flue outlets and flue	Clean and check for damage, vacuum out carefully			■			x	
Seal surfaces: door lining/furnace lining	Visual check	●					x	
Heating elements	Visual check (visible part of the heating element in the furnace chamber)	●					x	
Check for even power consumption of heating	Function test					●		x
Thermocouple	Visual check (visible part of the thermocouple in the furnace chamber)	●					x	
Set setpoint	Test according to work schedules	●					x	
Key:	■ = clean	● = check, replace			x = performance by			

Fig. 20: Maintenance table

Warning - Danger of Electric Shock!

Work on the electrical equipment may be done only by qualified, authorized electricians.

Note

Maintenance work must be performed by authorized personnel following the maintenance instructions and the accident prevention regulations. We recommend that the maintenance and repair work be carried out by the service team of Nabertherm GmbH.

6.3 Operating and Auxiliary Materials

6.4 Cleaning Products

Follow the procedure for switching off the furnace system (see section entitled "Operation"). Then pull the power plug from the outlet. Wait until the furnace has naturally cooled down to room temperature.

For dirt, use commercially available water-based or noncombustible, solvent-free cleaning agents to clean the housing; use air suction to clean the interior.
Make sure that the cleaning agent does not attack the water-soluble and therefore environmentally safe paint
Heed the labels and instructions on the packages for the cleaning agents.
Wipe off surface with a moist lint-free rag. The following cleaning agents may also be used:

This data must be completed by the operator.	
Component and Location	**Cleaning agent**
Exterior surfaces	
Interior	
Door seal	
Instrument panel	

Fig. 21: Cleaning agent

Carry out cleaning quickly to protect the surfaces.
After cleaning, completely remove cleaning agent from the surfaces using a moist lint-free rag.
After cleaning, check all supply lines and connections for leaks, loosened connections, abraded spots, and damage; report any defects immediately!
Please consult the section on "Environmental Regulations"

Note

The furnace, furnace chamber and add-on parts must NOT be cleaned with high-pressure cleaning equipment.

DANGER

- **Danger of electric shock.**
- **Risk of fatal injury**
- Before cleaning, pull out the power plug.
- Do NOT pour water or cleaning products over the inside or outside surfaces
- Allow oven to dry completely before operating it again

7 Faults

Work on the electrical system may be done only by qualified, authorized electricians.
Operators may only rectify faults that are obviously due to operating errors.
Call the local electrician for faults that you cannot localize.
If you have any questions, problems, or requirements, contact Nabertherm GmbH. By mail, phone, or e-mail → See "Nabertherm Service".

Type of fault	Possible causes	Fault rectification
Controller does not switch on.	-No voltage available. -Controller defective.	-Check connection fuse(s), renew if necessary. -Check controller fuses (if available), renew if necessary. -Check plug connector.
Controller indicates fault.	-See separate instructions for controller.	-See separate instructions for controller.
No heating chamber heating after starting program.	-Error in program input. -Connection fuse(s) defective. -Heating element defective	-Check heating program (see separate instructions for controller) -Check connection fuse(s), renew if necessary. Notify Nabertherm Service if the new fuse trips on screwing in. -Have checking carried out by Nabertherm Service.
Very slow heating chamber heating.	-Connection fuse(s) defective.	-Check connection fuse(s), renew if necessary. Notify Nabertherm Service if the new fuse trips on screwing in.
Selected end temperature is not reached.	-Lack of heater output due to undervoltage. -Heating element defective	-Have checking carried out by Nabertherm Service.
Glass bubbles on the surface of the heating element	-At temperatures above 1550°C (2822°F) fine glass bubbles can settle on the surface of the heating elements due to residual silicon during the production process.	- Before heating the furnace again remove the glass bubbles carefully (with a paintbrush or brush).

8 Spare Parts/Wearing Parts

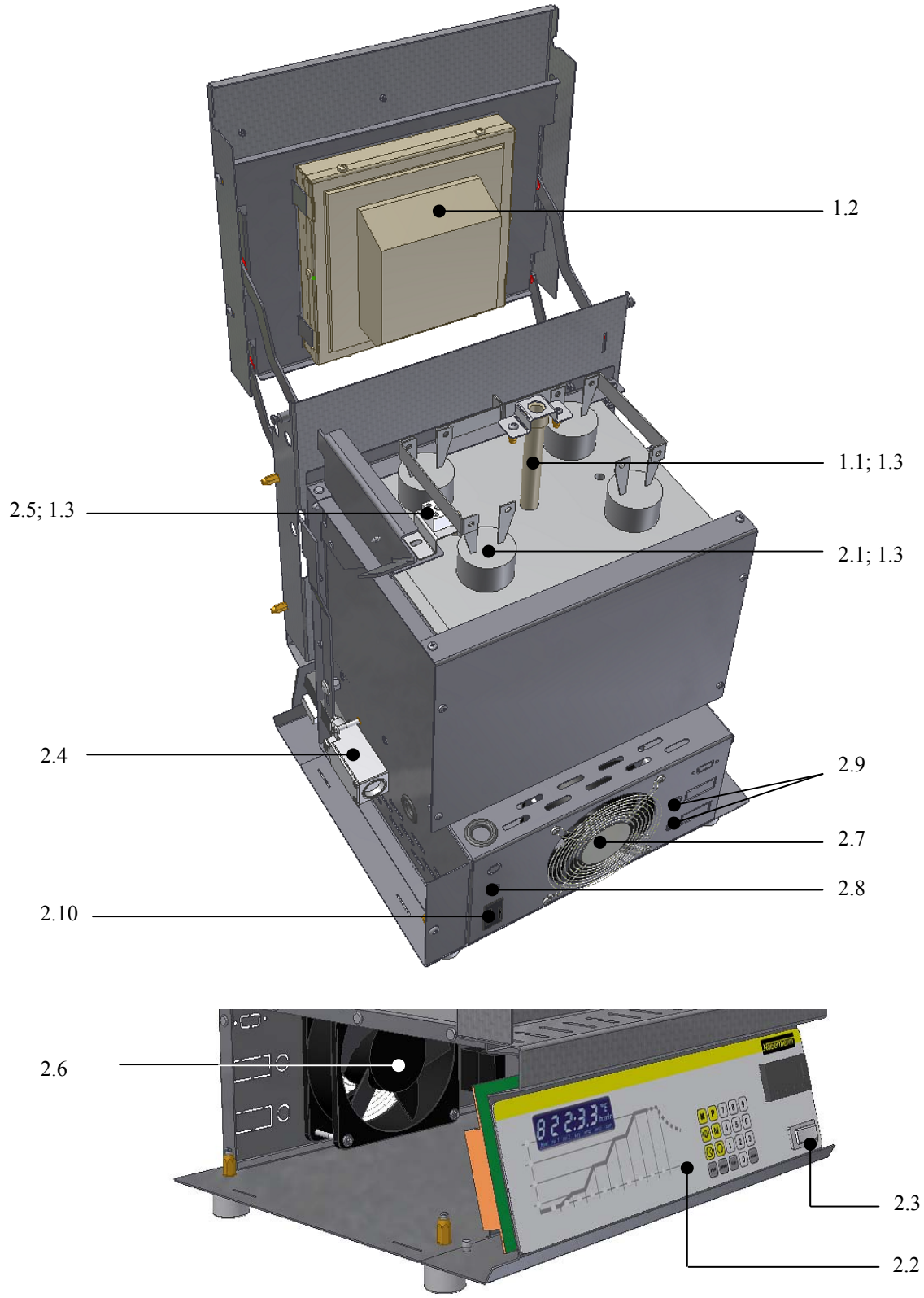


Fig. 22: Spare parts

Model		HTCT 01/14	HTCT 01/15	HTCT 01/16		
No.	**Name**	**Part number**	**Part number**	**Part number**		▶
1	**Furnace**					
1.1	Exhaust air tube (collar pipe)	692040198	692040198	692040198		●
1.2	Complete door insulation	601404453	601404453	601404453		●
1.3	Fiber wool	691600518 *)	691600518 *)	691600518 *)		●
2	**Electric/Controller**					
2.1	Heating element	692252462	692252462	692252462		●
2.2	Controller P 330	520100258	520100258	520100258		❍
	Controller P 180	520100257	520100257	520100257		❍
2.3	Rocker switch	541700200	541700200	541700200		❍
2.4	Door lock	541700001	541700001	541700001		❍
2.5	Thermocouple	540300257	540300257	540300257		●
2.6	Axial-flow fan	542400012	542400012	542400012		●
2.7	Papst-screen	691400585	691400585	691400585		●
2.8	T4A electronic fuse	541500200	541500200	541500200		●
2.9	T2A electronic fuse	541500182	541500182	541500182		●
2.10	Power cable (state country where it will be used)	V0013xx	V0013xx	V0013xx		●
	Transformer	541200089	541200089	541200089		●
3	**Tools**					
	Allen key	493000021	493000021	493000021		

*) = According to requirements

▶ **Symbols**

● Can be replaced by the customer with tools and instructions.

● Can be replaced by trained personnel with tools and instructions.

NT Nabertherm Service required

▶ **Note**

Original parts are designed especially for Nabertherm ovens. Replace parts only with original Nabertherm parts. Otherwise the warranty will be void. Nabertherm accepts absolutely no liability for damage caused by using parts that are not original Nabertherm parts.

8.1 Replacing a Heating Element

Warning - Danger of Electric Shock!

Work on the electrical equipment may be done only by qualified, authorized electricians. During maintenance work it must be ensured that the oven and the switching equipment cannot be activated by mistake (pull out the power plug) and that all moving parts in the oven are secured. Observe BGV A3 or the corresponding national regulations in the country where the oven is installed. Wait until the oven and the connected parts have cooled to room temperature.

Caution - damage to components!

Heating elements are extremely sensitive to breaking. Any strain on or rotation of the heating elements must be avoided. Failure to observe this rule will lead to the immediate destruction of the sensitive heating elements.

Exhaust air pipe

First slacken the screws (A) from the exhaust air pipe guard plate using the enclosed Allen key. Lift the guard plate (B) from the exhaust air pipe and then carefully pull the exhaust air pipe (C) out straight upwards. Store the exhaust air pipe in a safe place, as its material is very sensitive.

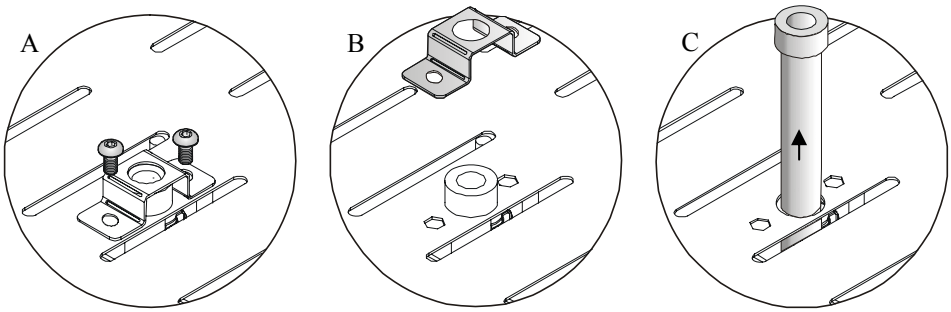


Fig. 23: Removing the exhaust air pipe

Dismantling the Furnace Lid

Unscrew the screws from the lid using the hex key that is provided. Lift the lid

Fig. 24: Dismantling the furnace lid

Replacing a Heating Element

Loosen the electrical contact/s Ⓐ with a suitable tool. Carefully remove the heating element Ⓑ in an upward direction.

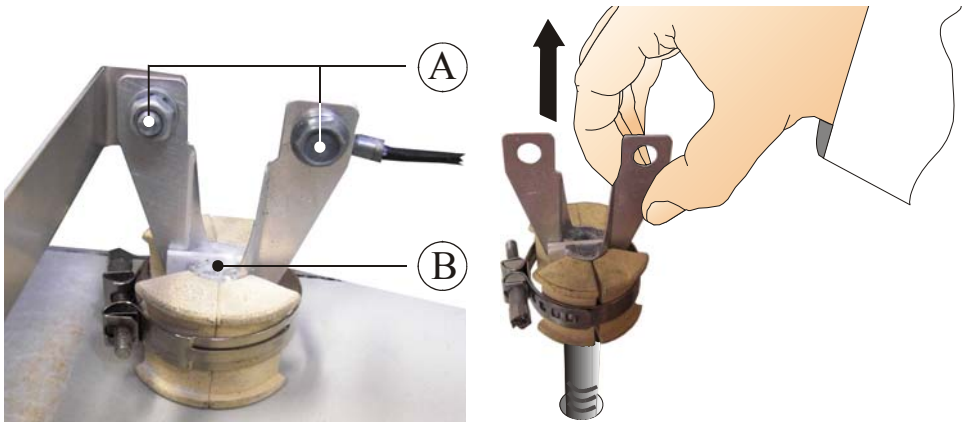


Fig. 25: Removing the heating element

Carefully slide a new heating element Ⓑ into the opening from above. Carefully stuff the opening with suitable fiber wadding Ⓒ. Openings that are not sealed properly cause the contacts to overheat, which in turn causes new heating elements to fail prematurely. Tighten the electrical contact/s Ⓐ in reverse order. Avoid all stress or twisting of the thermocouple.

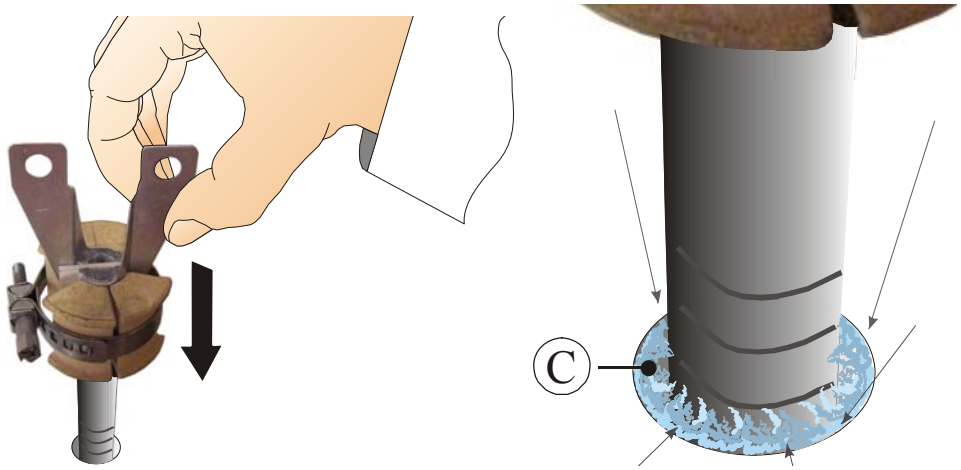


Fig. 26: Installing the heating element

Installing the Furnace Lid

Install the lid in the reverse order. Fix the lid using the screws that you previously unscrewed. Make sure that you place a tooth lock washer between the screw and the lid. This position is marked by a ground sticker on the housing/lid.

Fig. 27: Installing the furnace lid

Assembling the exhaust air pipe

Carefully push the exhaust air pipe (A) into the intended opening. The head of the exhaust air pipe must lie on the furnace lid. Reassemble the exhaust air pipe guard plate (B) using the previously slackened screws (C).

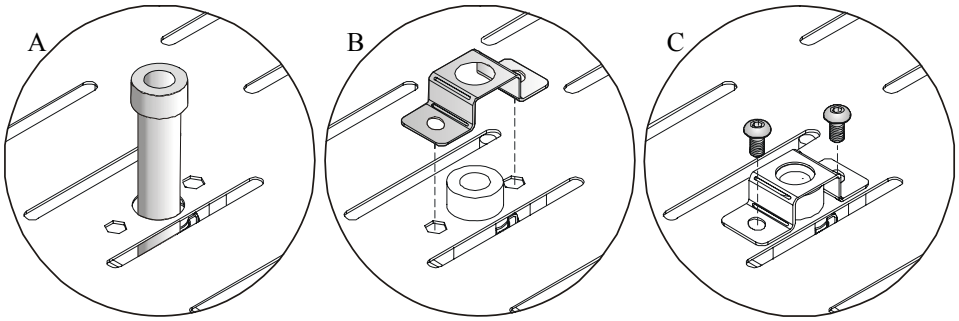


Fig. 28: Assembling the exhaust air pipe

Commissioning

Insert the mains power connector (see chapter "Connection to the Mains Electricity"), then switch on the power switch and check the function of the furnace (see chapter "Operation").

Note

***)** = Enclosed with spare part delivery.

8.2 Replacing a Thermocouple

Warning - Danger of Electric Shock!

Work on the electrical equipment may be done only by qualified, authorized electricians. During maintenance work it must be ensured that the oven and the switching equipment cannot be activated by mistake (pull out the power plug) and that all moving parts in the oven are secured. Observe BGV A3 or the corresponding national regulations in the country where the oven is installed. Wait until the oven and the connected parts have cooled to room temperature.

Caution - damage to components!

Thermocouples are extremely sensitive to breakage. Any strain on or rotation of the thermocouples must be avoided. Failure to observe this rule will lead to the immediate destruction of the sensitive thermocouples.

Exhaust air pipe

First slacken the screws (A) from the exhaust air pipe guard plate using the enclosed Allen key. Lift the guard plate (B) from the exhaust air pipe and then carefully pull the exhaust air pipe (C) out straight upwards. Store the exhaust air pipe in a safe place, as its material is very sensitive.

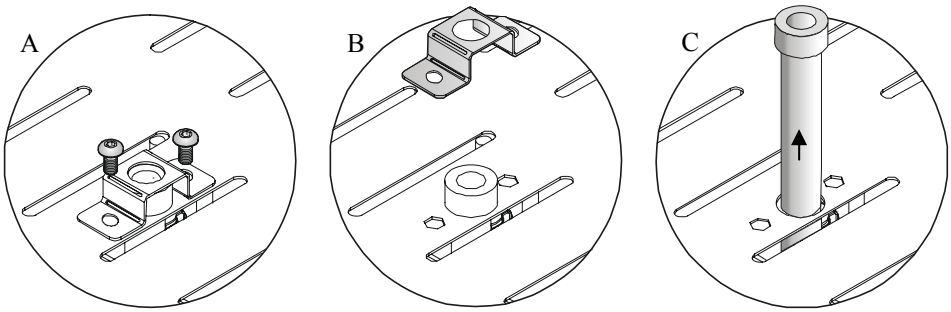


Fig. 29: Removing the exhaust air pipe

Dismantling the Furnace Lid

Unscrew the screws from the lid using the hex key that is provided. Lift the lid

Fig. 30: Dismantling the furnace lid

Replacing the thermocouple

First slacken the two screws (A) from the thermocouple connection. Slacken screw (B) from thermocouple retaining plate and pull thermocouple out upwards. Push a new thermocouple carefully into the thermocouple channel (C) and assemble and connect in reverse order. Attention must be paid to the correct polarity of the electrical connections (D) *).

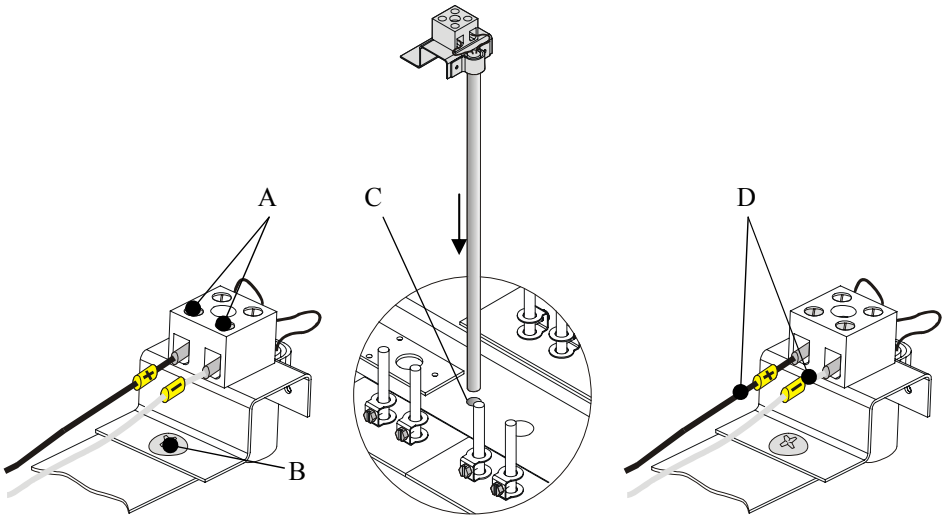
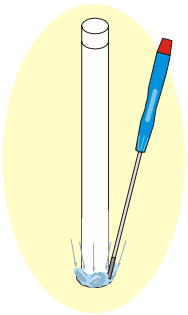


Fig. 31: Replacing the thermocouple



Note

After replacing the heating elements/thermocouples, fill the bushing to the furnace chamber with suitable fiber wool. Leaky bushings lead to overheating of the connection terminals and thereby to premature failure of the new heating elements/thermocouples.

Note

*) The connections of the connecting lines from the thermocouple to the controller are labeled with ⊕ and ⊖. It is absolutely essential to observe the correct polarity.

⊕ to ⊕ ⊖ to ⊖

Installing the Furnace Lid

Install the lid in the reverse order. Fix the lid using the screws that you previously unscrewed. Make sure that you place a tooth lock washer between the screw and the lid. This position is marked by a ground sticker on the housing/lid.

Fig. 32: Installing the furnace lid

Assembling the exhaust air pipe

Carefully push the exhaust air pipe (A) into the intended opening. The head of the exhaust air pipe must lie on the furnace lid. Reassemble the exhaust air pipe guard plate (B) using the previously slackened screws (C).

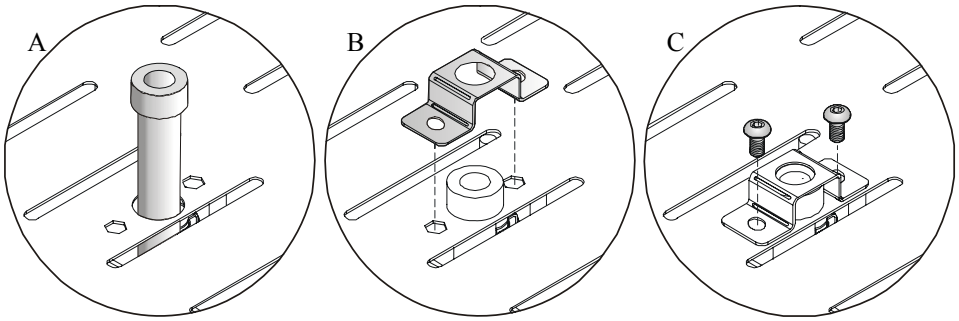
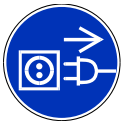


Fig. 33: Assembling the exhaust air pipe

Commissioning

Insert the mains power connector (see chapter "Connection to the Mains Electricity"), then switch on the power switch and check the function of the furnace (see chapter "Operation").

8.3 Replacement/Readjustment of the Door Insulation Structure



Warning! General hazards!

Work on the equipment may only be performed by qualified, authorized specialists. During work, the voltage supply to the furnace/switching system must be switched off to prevent unintentional commissioning (disconnect mains power connector) and all moving parts of the furnace must be secured. Observe BGV A3 or corresponding national guidelines of the country of use. Wait until the furnace chamber and attaching parts have cooled to room temperature.

Carefully swing the lift door upward. Unscrew the screws from the door cladding Ⓐ using the hex key that is provided and remove the cladding from the frame. Unscrew the door insulation Ⓑ. Pull and lift the the door insulation upward from the furnace to remove it.
Tip: Swing the lift door a little downward, as this allows you to remove the door insulation easier.

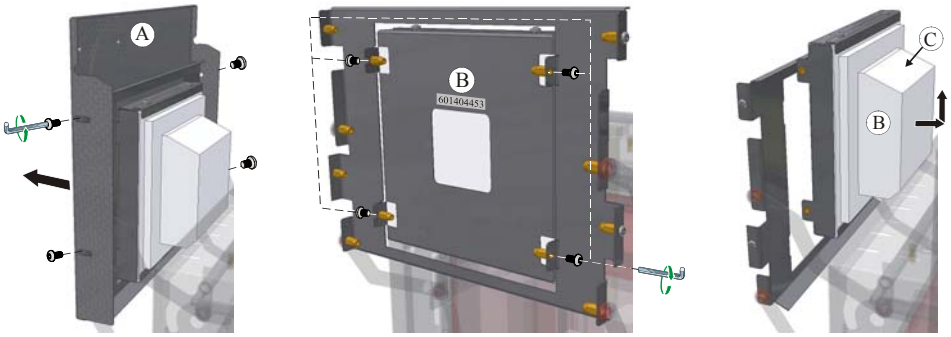


Fig. 34: Dismantling the door cladding/insulation

Install the new door insulation in the reverse order. The bevel of the Ⓒ door insulation faces upward. Screw the screws of the door insulation in loosely so that you can adjust the door insulation. Insulation is very sensitive, watch out for adjacent components. The door collar insulation Ⓓ must sit properly on the furnace collar insulation all around. Follow the instructions below to adjust the door insulation.

Carefully close the lift door. Press lightly against the door insulation ①. While doing so, tighten all the screws ②.

Install the door cladding in the reverse order.

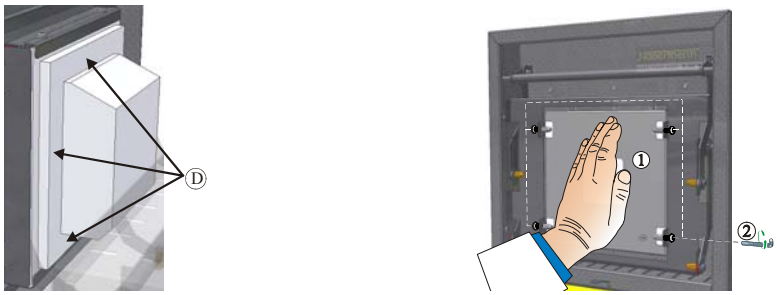


Fig. 35: Adjusting the door insulation

8.4 Replacing a Fuse

A fuse is located on the back of the furnace beside the power cable connection. The fuse is an important component of the power supply system and protects the furnace and its components against damage and fire. When you insert a new fuse, make sure that the fuse rating is suitable for the voltage used by your furnace.

	NOTICE
	• **Damage to the furnace and its components** • **Use of a fuse that is NOT suitable for the respective voltage may damage the furnace and its components and is a fire hazard.** • Use only a suitable fuse type. Check that the fuse type has the correct nominal current value.

Carry out the procedure to switch off the furnace (see "Operation"). Then pull the power plug out of the socket.

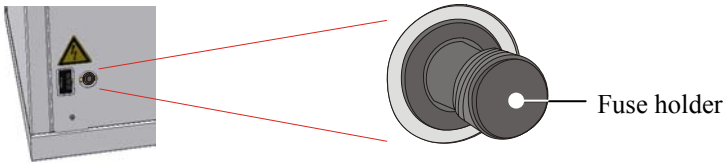


Fig. 36: The fuse is located in the back wall of the furnace.

- Turn the fuse holder 1/4 of a revolution in an anti-clockwise direction, and then carefully remove the fuse holder with your fingertips.

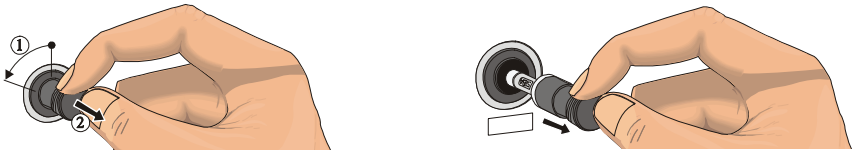


Fig. 37: Release and pull out the fuse holder

- Remove the fuse from the fuse holder.
- Replace the defective fuse with a similar fuse.
- Before you replace the fuse, make sure that it has the correct nominal current. For the correct fuse (fuse link), see "Spare Parts/Wearing Parts".

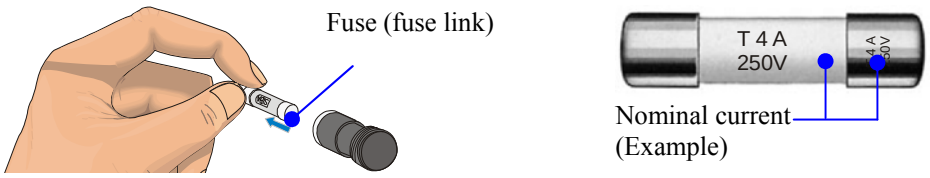


Fig. 38: Remove fuse

Note

The nominal current is engraved into the metal cap of the fuse or can be found imprinted directly on the fuse.

- Insert the new fuse into the fuse holder. Make sure that the fuse is pushed fully into the holder.
- Replace the fuse holder in the reverse order.

Fig. 39: Insert fuse

- Check that the power cable is not damaged. The power cable must not be damaged. Power cables may be replaced only with similar, approved cables.
- Reconnect the power cable (see "Connecting the Oven to the Power Supply")
- Switch on the furnace's power switch (see "Operation")

8.5 Separate the Snap-In Coupling (Plug) from the Furnace Housing

With a small flat blade screwdriver carefully push the locking latch ① upward while pulling the plug ② out of the coupling ③.

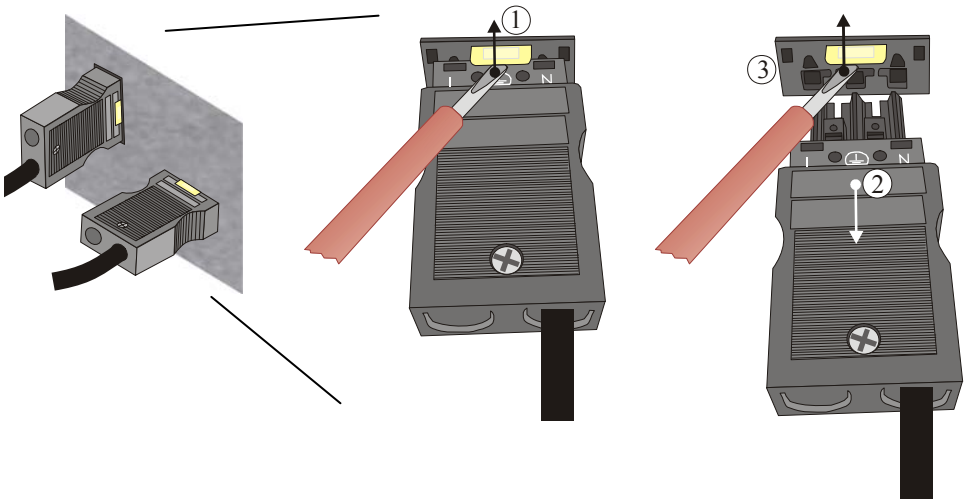


Fig. 40: Separate the snap-in coupling (plug) from the furnace housing

8.6 Repairing the Insulation

The insulation of the furnace consists of a very high-quality refractory material. Heat expansion may cause tears in the insulation even after a few heating cycles. However, these have no affect on the function or quality of the furnace. However, if entire "sections" of the insulation come loose, Nabertherm Service must be notified.

9 Electrical Connections (Circuit Diagram)

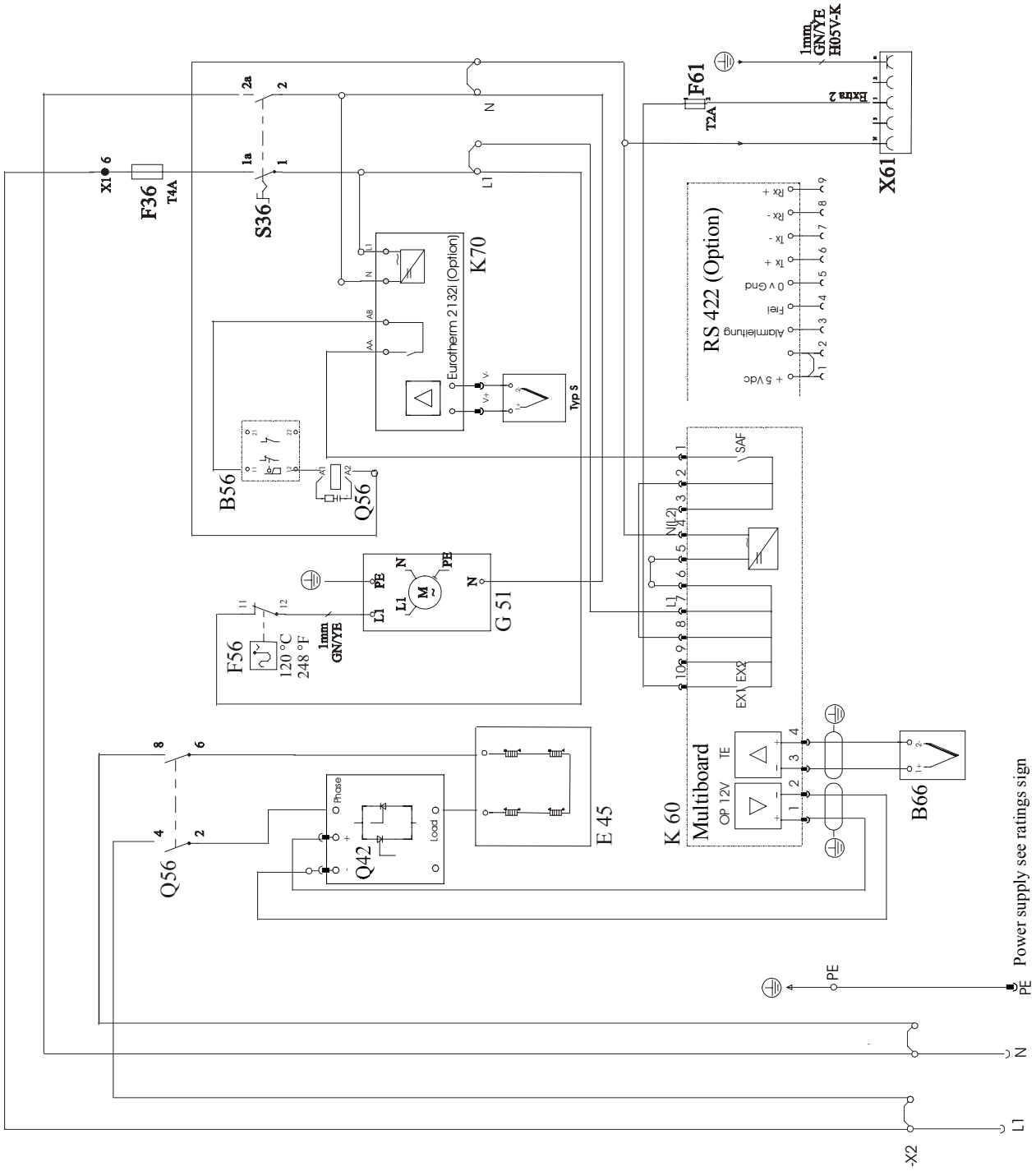


Fig. 41: 1/N/PE – AC 220-240V/50-60Hz

B66 Thermocouple
F36 Fuse control current
F56 Temperature Switch
Q56 Safety contactor
S36 Power switch
B56 Door switch
Q42 Semiconductor relay
K60 Controller
K70 Over-temperature limit controller
G51 Switchgear fan
X61 Snap-in socket
E45 Heating

10 Nabertherm Service

Contact Nabertherm Service at any time for maintenance and repair.
If you have any questions, problems, or requirements, contact Nabertherm GmbH. By mail, phone or e-mail.

Mail
Nabertherm GmbH
Bahnhofstrasse 20
28865 Lilienthal/Germany

Phone or Fax
Phone: +49 (4298) 922-0
Fax: +49 (4298) 922-129

Web or e-mail
www.nabertherm.com
contact@nabertherm.com

When you contact us, please have the type plate details of the oven or controller at hand.

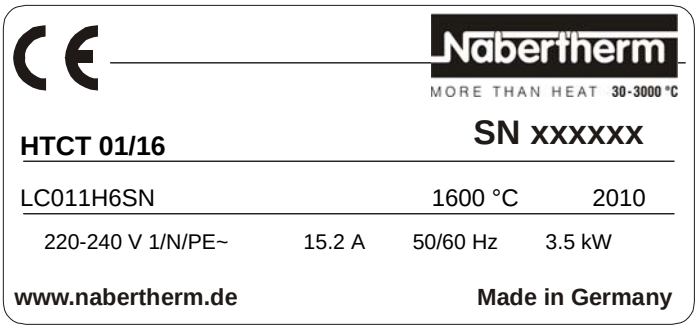


Fig. 42: Example: Type plate

11 Shut-Down, Dismantling, and Storage

To be Completed by the Operator

When the oven is shut down, the following safety information must be observed to prevent serious injury, damage to property, and damage to the environment.

The oven may only be shut down by authorized, trained personnel.

▶ The following operating materials/parts are to be disposed of by:

_____

_____

_____

_____

Oils and other substances that are hazardous to water must be completely removed before the oven is dismantled for reuse or scrap.

Ensure that operating materials, lubricants, and consumables are disposed of in an environmentally compliant manner. Regulations relating to proper waste recycling and disposal must be observed.

The oven may be lifted only at the intended points.

Use only the stated lifting and securing equipment to lift the oven/parts.

Consider a total weight of _____kg when choosing suitable lifting equipment.

For transportation, consider a permitted floor weight of at least _____kg/m².

▶ Before transporting the oven, attach the following securing equipment:

_____

_____

_____

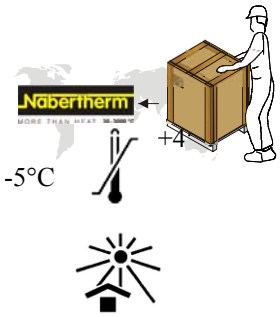
_____

▶

Note

Read the sections on "Safety" and "Transportation"

11.1 Transportation/Return Transportation



If you still have the original packaging, this is the safest way to send an oven.

Otherwise:
Choose suitable, adequately sturdy packaging. During transportation, packages are often stacked, bumped, or dropped; the packaging acts as external protection for your oven.

- **Drain all piping and containers before transportation/return transportation (e.g. cooling water). Pump off operating materials and dispose of properly.**
- **Do not subject the oven to extreme cold or hot temperatures (direct sunlight). Storage temperature -5°C to 45 ° (-23°F to 113°F) Humidity 5% to 80%, non condensing**
- **Place the oven on a level floor to prevent distortion.**
- **Packaging and transportation may be carried out only by qualified and authorized persons**

If your oven has transportation securing equipment (see "Transportation Securing Equipment"), use this.
Otherwise, in general:
"Fix" and "secure" (adhesive tape) all moving parts and cushion and protect any projecting parts against breakage.

Protect your electronic equipment against moisture and make sure that no loose packaging material can get inside it.

Fill gaps in your packaging with soft but adequately firm material (e.g. foam mats) and make sure that the equipment cannot slide around in the packaging.

If the goods are damaged during return transportation due to inadequate packaging or some other breach of duty, the costs will be borne by the customer.

As a rule:
The oven is sent without accessories, unless the technician expressly requests them.

Enclose a detailed description of the fault along with the oven – this saves the technician time and costs.

Don't forget to enclose the name and phone number of a contact in case there are any questions.

Note

Return transportation may only be carried out according to the information given on the packaging or in the transportation documents.

Note

Transportation and return transportation **not** covered by a warranty claim are paid for by the customer.

12 Declaration of Conformity

EC Declaration of Conformity

Compliant with EC Directive 2006/42/EC on machinery, Annex II A

We,

Nabertherm GmbH

Bahnhofstr. 20, 28865 Lilienthal, Germany

hereby declare that the following product:

Product	High-Temperature Furnace (Tabletop Model)
Model	HTCT 01/14 - HTCT 01/16

fulfills all the pertinent provisions contained in Directive 2006/42/EC.

The product named is also compliant with all the provisions of the following directives:

- Directive 2006/95/EC for electrical equipment designed for use within certain voltage limits
- Directive 2004/108/EC on electromagnetic compatibility

The signatories are authorized to compile the relevant technical documents. The address is the stated manufacturer's address.

Any change in the product not approved by the manufacturer invalidates this declaration.

- DIN EN 746-1 (02.2010)
- DIN EN 60204-1 (06.2007)
- DIN EN 60519-1 (05.2004), DIN EN 60519-2 (05.2007)
- DIN EN 61000-6-2 (03.2006), DIN EN 61000-6-4 (09.2007)

The following harmonized standards were applied:

Lilienthal, 19.05.2010

Thomas Adamek
Quality Management

Wolfgang Bartilla
Research and Development

13 For Your Notes

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